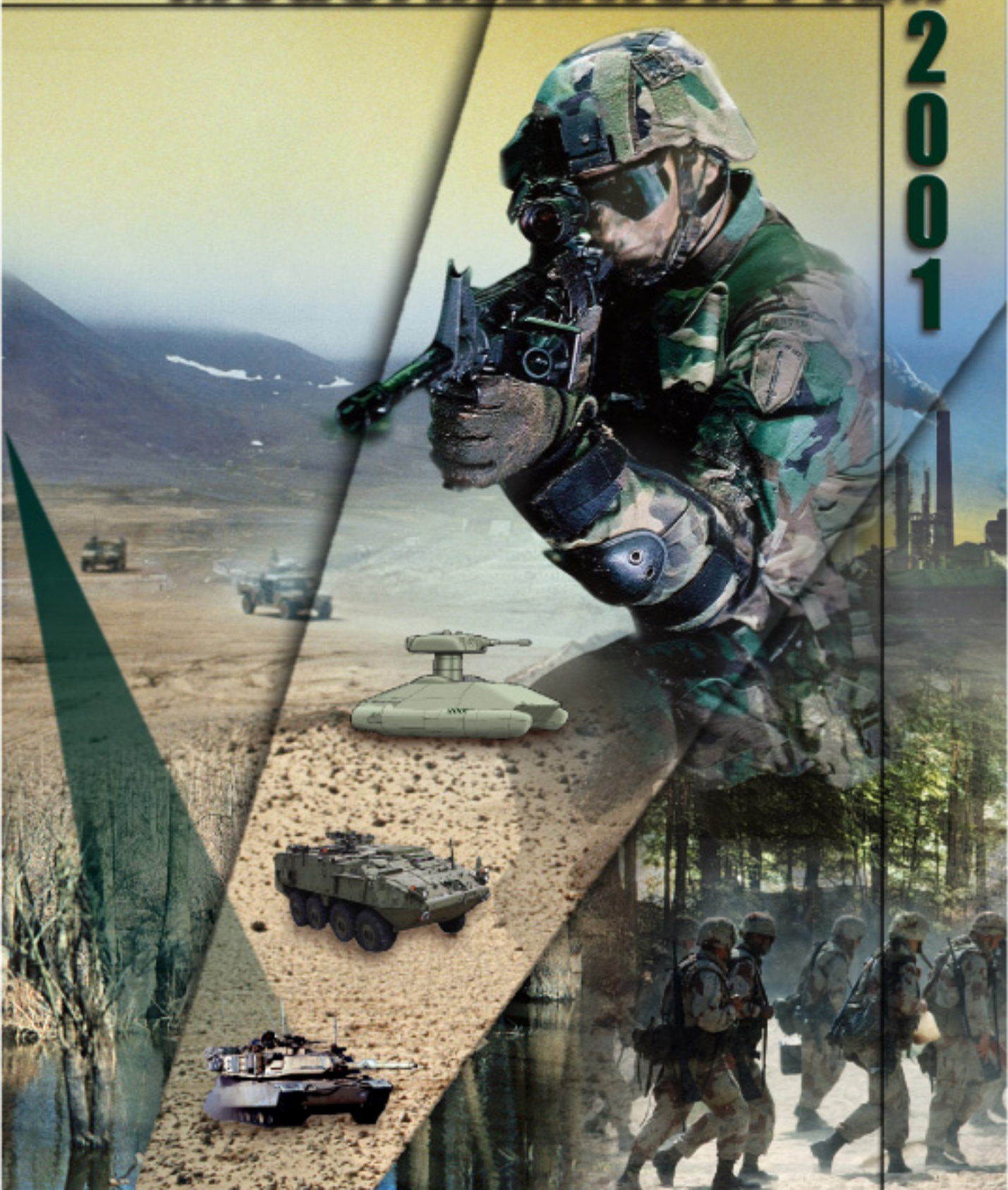


# Army Modernization Plan

2001





**DEPARTMENT OF THE ARMY**  
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PROGRAMS  
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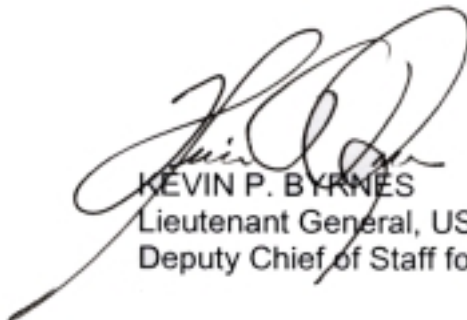
**SUBJECT: 2001 Army Modernization Plan**

In October 1999, the Army unveiled a new Vision, focused on people, readiness and transformation. Since then, the Army has moved out across all fronts to achieve the goals of this Vision. We are implementing the Vision and have embarked on a bold and comprehensive journey to an Objective Force that will be responsive and dominant across the entire spectrum of current and future military operations. We will do so while always maintaining our non-negotiable contract with the American people "to fight and win the Nation's wars."

This year's Modernization Plan provides the 'how to' description of the Army's force development effort to support and implement Transformation. It describes new Modernization and Investment Strategies adopted by the Army that place priority on pursuing advanced technologies and developing systems to meet future requirements.

This Modernization Plan describes how modernization efforts are supporting Army Transformation by building combat capable units using a comprehensive and balanced approach. In addition to implementing a fundamentally new emphasis in its Modernization and Investment Strategies, the Army has also adopted a modified construct in organizing its individual systems and programs. Reflecting this change, these programs are portrayed in the annexes to this Modernization Plan in terms of their role in providing the operational capabilities needed for future joint operations as identified in *Joint Vision 2020*.

Congress and the Department of Defense have responded positively to the Army's Transformation plan by providing additional resources to create initial momentum. The Presidential Budget for fiscal year 2002 reflects recognition of the accomplishments of the Army in successfully beginning Transformation. Continued support is imperative, however, for success in achieving Transformation while preserving the Army's unwavering commitment to the Nation.

  
KEVIN P. BYRNES  
Lieutenant General, USA  
Deputy Chief of Staff for Programs

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# Army Modernization Plan 2001

## Table of Contents

<b>Executive Summary</b> .....	iii
<b>Overview</b> .....	1
Purpose .....	2
The Changing Conduct of War .....	3
The Future Operational Environment .....	5
Why Change Now? .....	8
The Army Vision .....	10
<b>Army Transformation</b> .....	11
Transformation Paths .....	11
Objective Force .....	12
Required Capabilities of the Objective Force .....	12
Objective Force Characteristics .....	12
Interim Force .....	14
Interim Brigade Combat Team .....	16
The Interim Division .....	16
Command and Control .....	17
Legacy Force .....	17
Transformation Timelines .....	20
The Joint Framework .....	21
<b>Army Modernization</b> .....	23
Modernization Strategy .....	23
Modernization Tenets .....	24
Modernization Categories .....	24
Modernization Processes .....	24
Balanced Modernization .....	25
Investment Strategy .....	26
Objective Force .....	29
Science and Technology (S&T) .....	31
Objective Force Technology Areas .....	31
FCS Concept .....	33
FCS Program .....	35
Other S&T .....	35
Interim Force .....	36
Legacy Force .....	37
<b>Summary and Conclusion</b> .....	40



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<b>Annexes (<i>Joint Vision 2020: Conceptual Framework for Full Spectrum Dominance</i>)</b> .....	43
---	----

## Operational Concepts

<b>A. Dominant Maneuver</b> .....	A-1
Ground Combat Maneuver and Mobility Forces .....	A-3
Aviation Forces .....	A-25
<b>B. Full Dimensional Protection</b> .....	B-1
Air and Missile Defense .....	B-2
Nuclear, Biological, and Chemical Defense .....	B-13
Engineer Survivability Component .....	B-23
Military Police Component .....	B-25
<b>C. Precision Engagement</b> .....	C-1
Fire Support .....	C-2
<b>D. Focused Logistics</b> .....	D-1
Combat Service Support .....	D-2

## Essential Full Spectrum Enablers

<b>E. Information Superiority</b> .....	E-1
Command, Control, and Signal Systems .....	E-2
Intelligence and Electronic Warfare (IEW) .....	E-15
Engineer Component .....	E-27
<b>F. Space</b> .....	F-1
<b>G. Force Structure</b> .....	G-1

<b>Glossary</b> .....	Glossary-1
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# 2001 ARMY MODERNIZATION PLAN

## EXECUTIVE SUMMARY

### Future Dominance—Current Readiness

The Army Vision is all about People, Readiness, and Transformation. The *2001 Army Modernization Plan* addresses the **Transformation** aspect of the Army Vision. It discusses how the Army will harness the great potential offered by new and anticipated technologies to produce a future force that is strategically responsive and dominant across the full spectrum of operations.

The *Modernization Plan* describes new Modernization and Investment Strategies adopted by the Army that place priority on pursuing advanced technologies and developing systems that meet future requirements.

The Army's highest priority remains maintaining warfighting readiness. To support that imperative, the *Modernization Plan* also describes steps the Army will take to ensure warfighting readiness for current equipment requirements through limited modernization and recapitalization of warfighting systems in use today. These systems and their supporting infrastructure have been aging, and modernization has been repeatedly deferred to pay for other short-term requirements. This trend must now be reversed if the Army is to retain its ability to support the National Military Strategy.

### New Approach

The *Modernization Plan* describes how modernization efforts are supporting Army Transformation by building **combat-capable units** using a comprehensive and **balanced approach**. In addition to implementing a fundamentally new emphasis in its Modernization and Investment Strategies, the Army has also adopted a modified construct in organizing its individual systems and programs. Reflecting this change, these programs are portrayed in the annexes to this *Modernization Plan* in terms of their roles in providing the operational capabilities needed for future joint operations as identified in ***Joint Vision 2020***. Moreover, the internal organization of the Army's Force Development Directorate is likewise being adapted to reflect this new emphasis and approach.

### Modernization in Support of Transformation

To fund the new approach to modernization, the Army has already made tough decisions to divest and restructure some programs for the near term, while organizing and equipping the Army to operate effectively in a full spectrum environment in the future. Following are the **three broad tenets** of this new Modernization Strategy:

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1. **Accelerate science and technology (S&T)** to permit fielding of the Objective Force and, in particular, the Future Combat Systems (FCS), the foundation of that force. Ninety-six percent of S&T funding directly supports the Objective Force—37% of this for the FCS.
  2. **Act to meet immediate operational requirements** through fielding of an Interim Force based on incorporation of a family of new Interim Armored Vehicles (IAV). Two reorganized brigades have been established at Fort Lewis, Washington, and a contract has been awarded for the IAV.
  3. **Maintain and improve warfighting capabilities** of the current Legacy Force through selected modernization and recapitalization, thus ensuring preservation of combat superiority or overmatch at all levels.

Additionally, two important processes will facilitate implementation of the Army's *Modernization Plan*—Total Package Fielding and Unit Set Fielding, both of which work in consonance to produce combat-capable units in the shortest period of time.

## Investment Strategy

The implementation of modernization is characterized by a comprehensive and coordinated effort that emphasizes fielding an array of systems and supporting assets such as ranges, training aids, and simulators in the most efficient manner to provide combat-capable units to the Army. In

this endeavor, units will be equipped and fielded in unit sets. These unit sets will reflect the assist mechanism we use to build combat power, normally brigades. Consequently, we will build our future budgets, to the extent possible, in terms of brigade sets. This balanced modernization approach serves as the core component of the Investment Strategy and assists in determining the appropriate level of investments across the modernization categories. The ultimate purpose of this process is to build and maintain multifunctional, combat-capable units. The number one priority for the Army's investments is the development of the FCS. It remains essential, however, to continue with adequate investments in readiness and capabilities of the forces available to support the National Military Strategy and associated military operations. This investment will be limited to that which is necessary to maintain critical capabilities and, over time, these investments will be minimized further as older equipment is eliminated from the force and new, more capable units are fielded.

## Conclusion and Way Ahead

The Army has embarked on a revolutionary path and is doing well thus far. Congress and the Department of Defense (DoD) have responded positively to the Army's Transformation plan by providing additional resources to create initial momentum. The FY02 President's Budget recognizes the accomplishments of the Army in successfully beginning Transformation. However, maintaining sufficient readiness for the present while

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focusing on changes for the future will require additional resources if the Army is to succeed over time with both essential tasks. Continued support

from Congress and DoD is imperative to ensure Army success in achieving Transformation while preserving the unwavering commitment to the Nation.

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# ARMY MODERNIZATION PLAN 2001

## OVERVIEW

The Army has made great strides in implementing the Transformation process announced by the Army leadership in October 1999.

- The Army has made tough decisions to reprioritize resources to support new priorities.
- The Army has taken aggressive steps to accelerate essential science and technology (S&T) efforts to identify revolutionary new technologies for our future Army.
- The Army has reorganized two brigades at Fort Lewis, Washington, to a new design. Those units are currently training using new warfighting tactics, techniques, and procedures (TTP).
- The Army has awarded a contract for a family of Interim Armored Vehicles (IAV) to equip new interim brigade units with needed capabilities for contingency missions.
- The Army has devoted the necessary resources to maintain its warfighting readiness, which remains the top priority and is the basis upon which we execute our nonnegotiable contract with the American people—to fight and win our Nation's wars decisively.

Very importantly, Congress and the Department of Defense (DoD) have responded positively to our overall plan by providing both strong support in

principle as well as invaluable additional resources to help establish initial momentum in this process.

The Army's bold plan to transform itself came as a result of a thorough examination of the requirements established by the National Security Strategy (NSS) and National Military Strategy (NMS), an identification of future trends and directions affecting the future world environment and related strategic challenges to the United States, and full consideration to *Joint Vision 2020 (JV 2020)* that describes how U.S. forces will plan to operate in the present and in the future. The result was an innovative and forward-looking plan for a comprehensive **Transformation** that would apply to the entire Army, including Active Component (AC) and Reserve Component (RC), and organizational and institutional structures. This overall process has the goal of ensuring the Army's continued **strategic relevance** well into the future.

The Army's Vision is for a highly responsive, capabilities-based force able to meet all potential future threats and challenges. Building upon the preservation of essential current capabilities and the achievement of new ones through the application of revolutionary technologies, the Army seeks to maintain its position as the preeminent land force in the world. In this role, however, the Army fully



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participates as a member of a joint team, providing an array of capabilities available to the Nation's leaders. Moreover, the Army expects and plans on all missions being carried out in full cooperation with, and often dependence on, our fellow Services. The Army always has and will continue to depend on the Air Force and Navy to get to the operational theater. Hence, the achievement of adequate lift assets is of particular importance to the Army, as well as to the overall military preparedness of the Nation. Furthermore, the Army actively seeks close cooperation with our fellow Services throughout Transformation, as evident in recent coordination between the Army and the U.S. Marine Corps. This type of cooperative effort will be needed with all Services, as well as with our allies with whom future missions will most likely be conducted.

To achieve the Transformation goals—strategic responsiveness and dominating capabilities—the Army has a Modernization Strategy which focuses on developing and fielding revolutionary new capabilities for the future force, meeting immediate capability shortfalls through the fielding of new systems and organizations in the near future, and maintaining and improving those warfighting capabilities vital to fulfilling all missions assigned to the Army in the foreseeable future. Implementation of this strategy requires hard decisions and clear priorities among competing needs, and that it is the essence of the Army's Investment Strategy. This strategy is characterized by a fundamental shift to emphasis on the development of new systems and technologies that will support the future Army, or Objective

Force. Essential to this strategy, however, is a parallel component that balances modernization efforts and strategic risks by maintaining adequate readiness and capabilities for the Army of today. The true reflection of this Investment Strategy is the Army component of the FY02 President's Budget (PB02). This budget reflects the clear priorities and choices that the Army has identified and made to implement Transformation.

The Army has made measurable progress in a short time. Despite the initial progress, definite shortfalls exist that must be addressed to achieve complete success. Transformation is a long-term process, and the Army needs continued support and additional resources to preserve momentum for the future force while still providing a force today that meets the essential readiness requirements.

## **Purpose**

The *2001 Army Modernization Plan* focuses on building combat-capable units to support the Transformation of the Army and ultimately to ensure the world's preeminent ground force maintains the capability to fight and win our Nation's wars. This *Modernization Plan* describes the intent of Army investments over time to support transformation of the Army into a force that is strategically responsive and dominant at every point on the spectrum of operations. Together with the *Army Science and Technology Master Plan*, it provides the rationale and justification for the research, development, and acquisition (RDA) portion of the Army's program in

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support of the PB02. Specifically, the *Modernization Plan*:

- Describes Army Transformation and identifies how modernization supports Transformation.
- Describes the future operational environment the Army is likely to face and the future warfighting concepts the Army is expected to use in that environment.
- Explains how Army modernization in support of Transformation is directly linked to the *JV 2020 Operational Concepts*.
- Focuses modernization through the critical lenses of:
  - Transformation
  - Total Package Fielding
  - Unit Set Fielding
- Describes the Army's Modernization and Investment Strategies.
- Explains the critical necessity for the Objective, Interim, and Legacy Forces.
- Communicates Fiscal Year 2002 (FY02) budget priorities, identifies shortfalls, and shapes the conditions for Army budget planning through FY07.

The *Modernization Plan* does not offer the following:

- Specific details on all RDA programs, to include system programmatics (dollars, quantities). This information is provided in other documents to include the *U.S. Army 2001 Weapon Systems Handbook*.

- Specific commitment for budget figures for FY 2003-2007 and beyond. Any information reflected for these years is an estimate only based on current Army planning and is subject to change.
- Modernization schedules for units that are published and disseminated separately.
- Installation, training, and leader development programs related to modernization.

The *Modernization Plan* discusses specific time frames that are defined as near-term, 2001-2007; mid-term, 2008-2017; and far-term, 2018-2035.

## **The Changing Conduct of War**

The nature of 21st century warfare will remain little changed from warfare throughout recorded history. An act of violence undertaken to impose one group's will on another, war continues to have several enduring qualities. First, "war is a continuation of political activity by other means." No state or group engages in war without defining political objectives. War differs from other forms of state and non-state competition and interaction mainly in the ways and means used. Second, war is conducted in a dynamic environment filled with uncertainty and risk. Many complex variables combine to limit predictability and certainty. Outcomes are not determined by mathematical calculations but by the creativity of the commander, the artful employment of its forces, and the capabilities of those forces. Third, war remains an act of violent compulsion to achieve decisive, conclusive results. Conclusion of conflict occurs either

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when the enemy admits defeat and agrees to a negotiated end of hostilities or when it cannot continue. Finally, war will remain brutal, ugly, destructive, and personal, and it will continue to require physical and mental endurance of soldiers, leaders, and units.

While the nature of war changes slowly over time, the conduct of war is constantly undergoing change in response to new concepts, technologies, and capabilities. How armed forces adapt to change determines their readiness to confront future operational challenges and threats. Applied immediately, technical innovations can provide battlefield advantage, particularly when they facilitate or complement new ways to conduct war. However, new armaments employed in old ways do not necessarily guarantee advantage. New ways to fight may confound and overwhelm an enemy force even if technical superiority is not achieved. Rapid and continuing innovation presents significant challenges for adversaries, putting them in the position of playing a continuous game of “catch up.” Conversely, creative adversaries have countered qualitative superiority, new technologies, and new employment methods with both symmetric and asymmetric methods.

The Industrial and Information Revolutions transformed society and the ways and means by which warfare is conducted. Over the past several hundred years, the development of the rifled musket, machine gun, radio, truck, tank, airplane, and microprocessor radically changed the conduct of war. In the American Civil War, over 1,000 soldiers were required

to defend one linear mile of frontage. By World War II, the ratio had decreased to less than 400 for the same frontage. This trend is continuing. Responsive sensor-shooter linkages and improved precision munitions are increasing the effective firepower of military forces. To survive in the future, forces will require greater dispersion thereby decreasing the ratio of forces to space. Conversely, the increased range and lethality of weapons coupled with enhanced mobility and information management expand the size of the area of operations able to be controlled and dominated by a force of any size.

The widespread proliferation of advanced capabilities and new technologies, coupled with new concepts for their employment, are leading to a rapidly expanding, multidimensional battlespace. Operations are becoming more distributed in time, space, and purpose. Spatial relationships between opposing forces are increasingly nonlinear, blurring the distinctions between traditional deep, close, and rear operations. Warfare is also increasingly joint and multinational, with interagency participation. To win decisively, the joint force commander must threaten or attack the enemy in all dimensions—air, land, sea, space, and cyberspace. Multidimensional warfare provides the most certain means to overwhelm an adversary and compel its defeat. Ultimately, however, the outcome is most often determined by a decisive, synchronized assault requiring well-trained and equipped soldiers.

## Future Operational Environment



Figure 1. Future Operational Environment

### The Future Operational Environment

Over the next two decades, U.S. armed forces will operate in a geostrategic environment of considerable instability (Figure 1). New regional powers and transnational actors will emerge onto the global scene as today's driving forces of demographics, economics, and technology move both developed and developing states into global economic networks and alter the balance of power within regions. Global friction will occur as cultures, religions, governments, and economies interact in a highly competitive global setting. Over the past decade, there have been two major wars involving forces outside the affected region, more than 50 ethnic wars, and 170 border conflicts. There is every indication that violence on transnational, national, and subnational levels will continue for the next 20 years and beyond.

In spite of this global instability, most analysts agree that if current trends continue, the United States could enjoy a period of relative strategic calm in which no single foreign power could threaten its vital interests with conventional military forces. However, the establishment of regional alliances, short-term coalitions, or reallocation of spending priorities could quickly alter this trend. Even without significant increases in spending, competitors will emerge over the next two decades to challenge U.S. interests on a regional basis. Furthermore, ethnic rivalries and nationalism will increase as a source of international instability. In addition, increasing transnational threats such as international crime syndicates, terrorist networks, and drug cartels pose nontraditional security problems. Indeed, the most dangerous challenge will be combinations of state, nonstate, and transnational actors with global reach. For the foreseeable future, nations will remain wedded to strategies that have at their core the



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presence, use, and threatened use of military power as essential elements achieving national objectives.

In this environment, there is potential for any regional crisis to rapidly expand into a major theater war (MTW). For this reason, early engagement and rapid response that inhibit crisis expansion are the most common operations conducted in today's settings. These operations represent smaller scale contingencies (SSCs) that fall below the threshold of general war, but which typically involve combat actions that are limited in scope and objective. Whether in SSC or MTW, military operations in the foreseeable future will become more dynamic and less predictable.

During the Cold War, most nations adopted military constructs patterned after those of the two superpowers. Consequently, military operations around the world displayed a high degree of consistency. This is rapidly changing. States with the means to do so are pursuing lessons learned from U.S. operations and adopting professional qualities while incorporating adaptive strategies. These militaries are shedding Cold War patterns and developing capabilities more suitable to their particular cultures, circumstances, and threats. They are streamlining structures, creating more professional, mobile, and mature capabilities with greater focus on regional employment to satisfy long simmering grudges or hegemonic ambitions. In general, these states are improving ground forces, communications, intelligence, and special operations force capabilities. Those who believe

themselves to be threatened by the United States are developing adaptive strategies, tactics, and force designs suitable to exploit perceived vulnerabilities and to counter or mitigate U.S. strengths. Overall, potential adversaries are basing their investments in military technologies on their perceptions of how the United States has historically operated.

In general, common foreign perceptions of the United States are:

- It is unwilling to accept heavy losses and is risk-averse.
- It avoids close combat and relies on standoff technologies and air superiority.
- Its leadership is very sensitive to domestic and world opinion.
- It lacks commitment over time.
- Its pattern of military operations is predictable.

Because the United States has a military largely dependent upon force projection, it is tied to a strategy requiring entry operations and a deliberate build up of force capabilities as part of its operational construct. Today, this strategy demands airfields and seaports in the area of operations, forward operating bases for air forces, significant in-theater logistical stockpiles, secure air and sea lines of communication, technical intelligence, surveillance and reconnaissance capability, as well as long-distance communications for command and control. These perceptions represent critical vulnerabilities that are assailable.

The vulnerability most frequently discussed among potential U.S.



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adversaries is the need for U.S. forces to gain access to the area of operations. This discussion has led to a significant investment of regional powers in anti-access capabilities that will soon increase the risk to U.S. power projection, especially the positioning of friendly forces within operational reach of enemy capabilities. Adversaries will seek to employ advanced capabilities, particularly long-range strike, to deny, delay, and degrade U.S. intervention, creating an operational exclusion zone that can only be breached at great cost. The longer the enemy can delay effective U.S. response, the greater its chances for success. While this rising challenge will be offset to some extent by the increasing strategic reach of U.S. forces, it presents a dilemma to U.S. leaders and opportunities to U.S. opponents. Operations constructed on the employment of strategic reach capabilities alone will likely be short in duration, limited in objective, difficult to sustain, and susceptible to interdiction.

Failing to deny access, the enemy will attempt to degrade U.S. force projection, hold initial gains, and extend the conflict while preserving its own military capability. Recognizing its vulnerability to U.S. precision strike and control of the air, the enemy will likely forego mass formations and momentum through use of echelons and pursue a policy of selective precision strike, maneuver, and other asymmetric actions. To reduce exposure and complicate U.S. targeting, the adversary will hide and disperse large formations in areas of physical and moral sanctuary often located in complex, urban terrain and shielded by civilians and man-made

structures. From this largely defensive posture, the enemy will marshal precision capabilities in time and space to strike carefully selected targets to demonstrate U.S. vulnerability, create casualties, or to degrade or destroy specific capabilities.

Asymmetric actions will likely include use of special operations forces, terror, long-range strike, weapons of mass effects, and information capabilities. With respect to the latter, adversaries, both small and large, will attempt to counter U.S. strengths by attacking our critical dependence on Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) as well as our ability to sustain positive informational interfaces with host nations, the media, and multinational or interagency partners. It will aggressively conduct strategic operations to degrade U.S. national will, fracture alliances and coalitions, and limit the scope of U.S. involvement.

Once forces are committed to the area of operations, a capable U.S. adversary will not always avoid battle. Although dispersed to counter U.S. advantages in precision engagement, it will conduct focused, decentralized operations when it perceives an advantage or opportunities exist for decisive offensive action. Choosing objectives carefully in order to achieve maximum effects, it will attempt to initiate force-on-force battles at a time and place of its choosing, integrating nonlinear maneuver and all-source (long- and short-range) precision fires, with simultaneous operations by unconventional and special purpose forces. The focus will be on a system

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warfare approach where the objective of combat action is to rob the opposing force of the benefits derived from its system-of-systems synergy. It will attempt to offset air, intelligence, surveillance, and reconnaissance and other technological advantages by fighting in complex terrain and urban environments where it can gain sanctuary from U.S. effects, or by fighting during periods of reduced visibility, while denying these areas and their inherent protective characteristics to U.S. forces. Overall, even though the enemy's general posture is defensive in character, the effect will be to create conditions where U.S. forces remain under constant exposure to focused offensive action, synchronized and initiated from dispersed locations.

Future Army forces must be capable of effective responses against both modernized conventional forces employed unconventionally, as well as unconventional forces and means employed in accordance with asymmetric strategies and tactics. More importantly, the focus of potential adversaries on developing ways, ends, and means to deal with U.S. forces suggests that historical success will not be a reliable indicator of future military operations. The real test for dealing with the future threat is the ability of U.S. armed forces in general and the Army in particular to maintain its current decisive overmatch while developing strategies, doctrine, organizations, and systems to fight adaptive adversaries. Army forces must have the ability to change faster than the enemy can react by fielding future forces that possess rapid mobility; endurance; precision fires;

adaptive leaders; tactical and operational standoff with direct and indirect fires and vertical maneuver; and the ability to conduct joint, combined, interagency operations, and ground maneuver with great precision over both operational and tactical distances. Moreover, Army forces must have the capability to deny sanctuary; dominate all environments; conduct simultaneous or near-simultaneous decisive, shaping, and sustaining operations; and destroy regime-ensuring forces in detail to promote a stable outcome. Finally, Army forces must be prepared for sustained operations against an adversary whose principal aim is to prolong conflict and avoid decision.

## Why Change Now?

To meet the challenges of the future operating environment and the wider range of potential threats, the United States will require an agile, world-class Army capable of rapid response and dominance across the entire spectrum of operations in a joint, interagency, and multinational environment.

The United States, due to its unique position as the dominant military power in the world at this point in history, can transform itself—now. To successfully transform, the Army will take prudent risk in the short-term while maintaining its nonnegotiable contract with the American people to fight and win our Nation's wars.

The current Army forces, heavy and light, are the best in the world. There are, however, deficiencies that must be addressed, and the time to do it is now. The Army's superb armored forces are

unequalled in their ability to gain and hold terrain in the most intense, direct fire combat imaginable. Once deployed, they are the decisive element in MTWs. The current heavy forces are challenged, however, in their ability to deploy quickly to all of the places we are asked to go. Once deployed, these forces require a large logistical support base in theater to maintain their combat power, and their mobility may be limited by the infrastructure of the theater. At the other end of the spectrum, the Army's current light forces can rapidly deploy anywhere in the world and strike quickly, but lack sustained survivability, lethality, and tactical mobility once inserted. These magnificent forces, both heavy and light, are thus respectively lacking in some aspects of warfighting capabilities that will become increasingly important in a rapidly changing world. The experiences of U.S. Army forces in operational missions since the end of the Cold War—in Panama, the Gulf,

Somalia, Bosnia, and Kosovo—have demonstrated clearly that capability gaps exist and that they limit our ability to respond and act decisively in the wide variety of environments in which our forces have been and are likely to be employed.

The future need is to close these capability gaps by investing in greater lethality, survivability, and deployability across the entire force, thus resulting in overwhelming dominance for full spectrum operations. Our forces must be able to dominate at all levels of operation, ranging from SSCs to MTW. At the same time, the forces must become more deployable and sustainable, sustainable with a smaller logistical presence, and capable of reaching back to in-theater and out-of-theater sources for essential combat support.

The demands of the changing strategic and operational environment, combined with the strengths and



Figure 2. Why Army Transformation?

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limitations of today's Army, point to the need for fundamental change. Technological potential for revolutionary advancements is now sufficiently promising to make such substantive change achievable. Recognizing the need to correct existing operational deficiencies, meet the projected requirements of the future strategic environment, and capitalize on the revolution in technology, the Army is the process of transforming itself. (Figure 2)

## The Army Vision

Acknowledging the need to change and meet the defense challenges of the future, the Secretary of the Army and the Chief of Staff, Army articulated in October 1999 a clear Army Vision:

**Soldiers on point for the Nation, transforming the most respected Army in the world into a strategically responsive force that is dominant across the full spectrum of operations.**

This Vision is built upon the solid foundation of hard work that previously has taken place in the Army and will combine it with new initiatives that will take advantage of advanced technologies to meet future requirements of the 21st century. The Vision's goal is to ensure that the Army fulfills its responsibilities to provide dominant landpower forces to meet the requirements of the NSS and NMS. There are three integral components of the Army Vision—**people, readiness, and transformation.**

**People** remain the centerpiece of the Army, and soldiers—Active, Guard, and Reserve—are its investment in and link to the Nation. The Army is more than just soldiers; it also includes civilians, family members, retirees, and veterans, all serving the Nation in an extended manner. The well being of this entire group is of fundamental importance to the Army and contributes to progress in the other two components of the Vision.

**Readiness** remains, as it has always been, the Army's top priority. The Army has a nonnegotiable contract with the American people—to fight and win the Nation's wars. Throughout Transformation, the Army will ensure that it can meet the demands of the NMS and the requirements specified in the Joint Strategic Capabilities Plan (JSCP), and support the operational requirements of the Commanders-in-Chief (CINCs), unified combatant commands.

**Transformation** represents the necessary change in the nature and composition of the force itself. The transformed force that will achieve the Army Vision is an Objective Force that is **responsive, deployable, agile, versatile, lethal, survivable, and sustainable**—all of the required characteristics needed for the future. As an objective measure of force responsiveness, the Army will achieve the capability to deploy a combat-capable brigade anywhere in the world in 96 hours, a combat-capable division anywhere in 120 hours, and five combat-capable divisions anywhere in 30 days.

## ARMY TRANSFORMATION

To implement the Vision, the Army will transform itself as rapidly as possible, maintaining focus on warfighting readiness and taking care of its people. The Army's challenge will be maintaining a trained and ready force capable of decisively executing the NMS and winning the Nation's wars while, at the same time, transforming both the operational and institutional Army that underpins both Transformation and warfighting readiness.

Modernization is fundamentally about maintaining the capabilities we have and obtaining those necessary to assure dominant overmatch or superiority against any potential adversary today and into the future. Our capabilities are embodied in our organizations. This *Modernization Plan* describes the equipping actions supporting the Army's evolution to the

Objective Force. In general, the Army's Transformation strategy progresses along the three major paths or vectors depicted in Figure 3—the **Objective Force**, the **Interim Force**, and the **Legacy Force**.

### Transformation Paths

Today's Army—the Legacy Force—consists of both heavy and light forces. It employs specialized organizations that focus on excellence at the low and high ends of the operational spectrum. As a result, the Legacy Force is a bifurcated force. It contains strategically agile light forces that can deploy very rapidly, but lack the necessary mobility, lethality, and survivability to oppose the full range of potential enemy capabilities once deployed. Conversely, its heavy forces possess unmatched lethality,

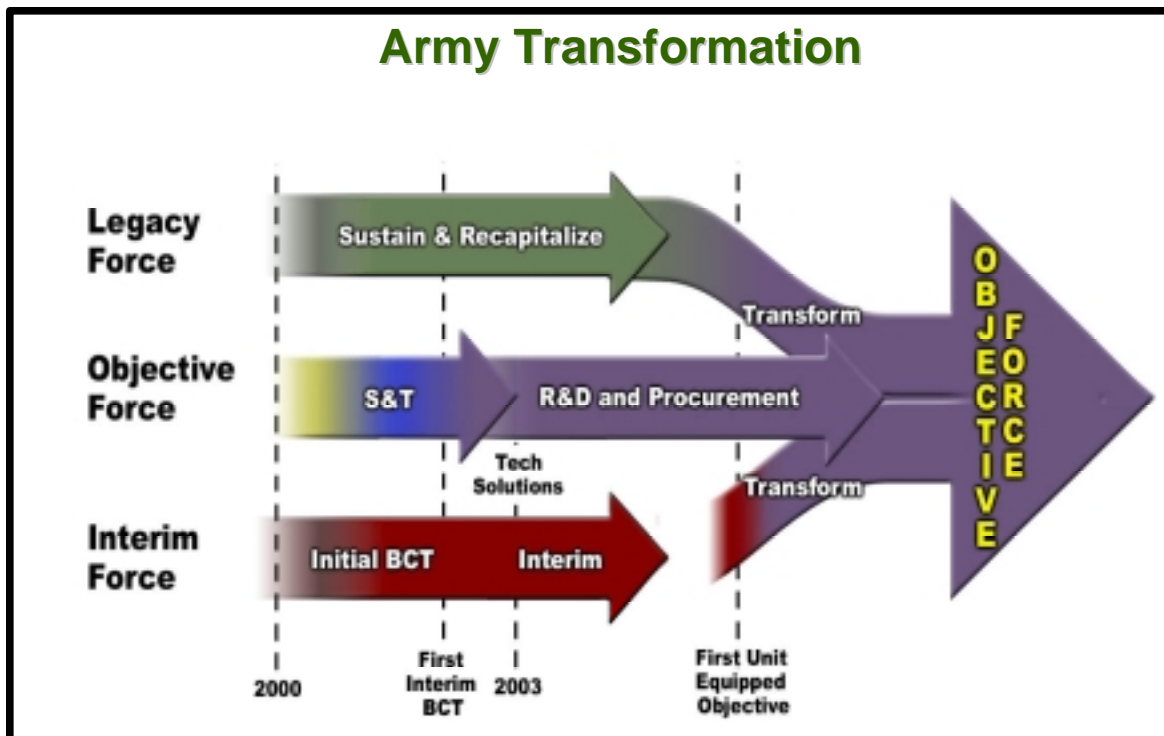


Figure 3. Army Transformation



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survivability, tactical mobility, and endurance, but require too much time and too many assets to deploy quickly given current joint capabilities for strategic lift.

Constraints on lift apportioned to ground forces introduce delays in the build-up of a synchronized joint force. These constraints often lead to the initial introduction of ground force packages that lack deterrent credibility because they are unable to immediately conduct multidimensional operations. Prepositioned war stocks reduce strategic lift requirements, but only in the specific regions where those stocks are stored or can be quickly inserted. Consequently, today's limited strategic lift causes U.S. military response to follow a predictably sequential deployment pattern to build sufficient military power to contain, shape, and achieve decision. This reduces the deterrent effect of U.S. forces in regional conflicts. Transformation of the Army into a lighter, more deployable force will partially address these issues, but must be complemented by a comprehensive program to improve joint strategic lift capabilities for both the Legacy Force and the future forces.

## **Objective Force**

The Objective Force will be designed to provide decisive combat power to dominate land operations in future joint contingencies. It will be a strategically responsive, general-purpose force that participates in all phases of the joint campaign, in all environments, weather, and terrain. The force will incorporate revolutionary change embodied in advanced C4ISR capabilities; the Future Combat

Systems (FCS); the future reconnaissance, lift, and attack aircraft; and the products of the "revolution in military logistics." Employing these enablers, the Objective Force becomes an offensively oriented, extraordinarily versatile, multidimensional maneuver force capable of executing innovative operational concepts.

## **Required Capabilities of the Objective Force**

In the Army force development process, capabilities are derived from concepts. As a preface to this discussion, it is imperative to note that soldiers and their leaders remain the centerpiece of the Objective Force. The Army builds capabilities and forces around soldiers to fully exploit and sustain the human dimension of warfare, rather than building platforms that are simply enabled by soldiers. Army forces do not fight platforms; they fight soldiers led by capable leaders, organized into effective units, and enabled by advanced capabilities to create overmatching combat power. Consequently, as the capabilities described below are developed, the Army will devote a similar, comprehensive effort to insuring that its soldiers and leaders are trained, educated, and equipped to meet the requirements of future conflict.

## **Objective Force Characteristics**

The degree to which the Objective Force fully embodies the characteristics outlined in the Army Vision—responsive, deployable, agile, versatile, lethal, survivable, and sustainable—will determine to a significant degree the overall capability

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of the force to carry out its core operational tasks within the joint campaign.

A **responsive** and **deployable** Objective Force empowers joint commanders with broader options, frustrates enemy timelines, cements the coalition early by its representation of national resolve, and provides the capability to assure the outcome on our timeline and our conditions. Responsiveness and deployability will be achieved in part through lighter formations, reductions in deployment tonnages, improved military and civilian force projection platforms, advanced en route planning/rehearsal tools, and simplification and reduction of reception, staging, onward movement, and integration requirements. Responsiveness is also improved through force design and organizational principles—modularity, force pooling, general-purpose design—that permit the commander to rapidly tailor and deploy the appropriate force for each contingency and to transition to other forms of operations when battlefield conditions change. While we will retain forcible entry capability, improved air and sea lift systems, supplemented by expanded joint over-the-shore capabilities, will mitigate the requirement for forcible entry, enabling the Objective Force to choose the time and place to enter the battlespace, establish lodgment(s), and/or secure airports and seaports.

Effective joint operations place a premium on **agility** and **versatility**. The inherent versatility of the Objective Force provides the joint commander with general-purpose utility and

dominance across the entire spectrum of operations. Objective Force agility and versatility will enable seamless transition between benign and hostile environments, within and between operations, including transition from stability and support operations to higher intensity offensive and defensive operations. Conversely, if deployed initially for warfighting, Objective Force units can seamlessly execute lower intensity operations, either simultaneously or subsequently. In short, physical and mental agility supports transition across mission sets and enables the force to dominate all environments, threats, and terrains, enhancing operational flexibility through multifunctional application of the force.

**Lethality.** Lethality is the sum of actions taken to close with and destroy the enemy. Objective Force units will deliver overmatching combat power with integrated combined arms capability at the lowest levels of the organizational design. Central to this capability is the ability to use decisive fires, maneuver, and assault to assure complete destruction of the enemy. At the tactical level, the close combat zone will expand in size and focus will shift toward fighting and winning beyond-line-of-sight engagements. Lethal units dominate battle through employment of overmatching sensors and firepower capabilities at ranges that exceed those of the enemy. Freedom of maneuver for lethal units is provided through mobile/survivable systems and units.

**Survivability.** Whether mounted or dismounted, Objective Force soldiers will have absolute confidence in their

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ability to defeat any enemy and survive to fight the next battle. Survivability will be achieved holistically through force shielding, i.e., through a system-of-systems approach that integrates physical capabilities for survivability with the manner in which the force is employed. In the past, the Army built systems capable of surviving direct-fire hits. Objective Force survivability, in contrast, includes the effective integration of active and passive means of protection, of combining advanced situational understanding, mutual interaction between platforms and dismounted soldiers, greater stand-off ranges, improved avoidance of detection, hit avoidance, and penetration protection to achieve survivability.

**Sustainability.** Continuing progress in the “revolution in military logistics” is critical to achieve the Objective Force operational concept. To improve responsiveness, reduce vulnerability, and increase operational momentum, the Objective Force will seek to reduce the current in-theater logistics footprint. The efficiencies required in the Objective Force can be attained primarily by investing in the technologies and enablers that support focused logistics and that will truly revolutionize military logistics. Objective Force units will sustain multiple operations through means of ultra-reliable systems, systems commonality, revolutionary power generation, higher fuel efficiency, and improved system maintainability. Sharply reduced sustainment demands, particularly for water, fuels, and munitions, will reduce throughput and infrastructure requirements. Additionally, C4ISR-enabled split-based operations will further reduce

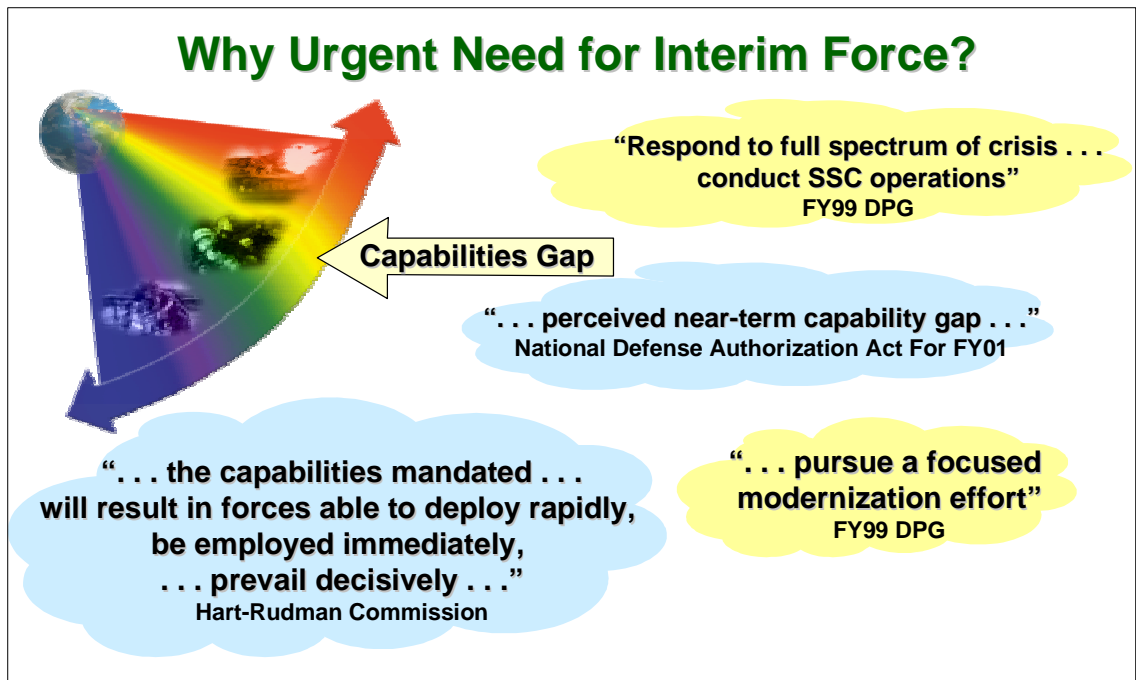
the in-theater footprint. These improvements will produce a more strategically responsive force, which can sustain a higher tempo of operations and seamlessly execute transition between operations and phases of the campaign. As these changes are implemented, however, the Objective Force will retain the infrastructure and capabilities required to sustain and support the joint force in accordance with the Army’s mandated joint responsibilities (e.g., Common User Logistics).

## Interim Force

The **Interim Force** will fill a current capability gap (Figure 4). To achieve requisite capabilities at the operational and tactical levels, it will be a combined arms force in both design and manner of deployment and employment. It will be organized as a rapidly deployable, full spectrum force, providing the warfighting CINCs with increased options for SSCs, while not compromising readiness for MTWs. Its design also will support rapid integration of multinational and interagency capabilities for peace keeping/peace enforcement and warfighting missions.

The Interim Force will provide a highly capable, strategically responsive combat force that can seize the initiative before an enemy force can attain its initial goals and become set in an operational position that makes it hard to defeat.

Interim Force units will be highly mobile at the strategic, operational, and tactical levels. These units will complement Legacy Force units to



**Figure 4. Why Urgent Need for Interim Force?**

provide the overall tactical superiority required to meet the full range of future operational requirements. Equipped with a family of IAVs, lightweight artillery, and other available technology, these units are being designed to maximize lethality and survivability while increasing tactical, operational, and strategic maneuver. Lighter than the heavy force and more capable than light units, they will allow us to take greater advantage of available strategic lift. Operationally, they will be transportable in C-130 or equivalent aircraft. The brigade base will be self-contained, fully mobile, and completely air deployable. Its deploying units will be "force forwarded" as combat ready units, designed to arrive operationally capable immediately upon debarking in the area of operations. Although it will not possess all of the capabilities of the Objective Force, the Interim Force will provide the joint and multinational force commander increased operational and

tactical flexibility to execute the fast-paced, distributed, noncontiguous operations envisioned in *JV 2020*.

Organized with three combined arms infantry battalions and the most robust reconnaissance, surveillance, and target acquisition squadron of any brigade in the Army, the Interim Brigade Combat Team (IBCT) will be equipped with an IAV that will give it greater lethality, survivability, and tactical mobility than existing crisis response formations. Rapid deployability, early autonomous operational effectiveness, and the ability to quickly develop situational understanding are the keys to successful operations. The Interim Force's two core qualities are tactical mobility and decisive close combat capability. Though they will normally be employed within a divisional structure where additional augmentation is available, the Interim Force units will have organic combat, combat support, and combat service

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support capabilities that will make them highly self-sufficient, whether employed as IBCTs or as elements of a division.

## Interim Brigade Combat Team

The IBCT is a **full spectrum, combat force**. It has utility, confirmed through extensive analysis, in all operational environments against all projected future threats, but it is designed and optimized primarily for employment in SSCs in complex and urban terrain, confronting low-end and mid-range threats that may employ both conventional and asymmetric capabilities. Fully integrated within the Joint Contingency Force, the IBCT deploys very rapidly, executes early entry, and conducts effective combat operations immediately on arrival to prevent, contain, stabilize, or resolve a conflict through shaping and decisive operations. The IBCT participates in MTWs, with augmentation, as a subordinate maneuver component within a division or corps, in a variety of possible roles. The IBCT also participates with appropriate augmentation in stability and support operations (SASO) as an initial entry force and/or as a guarantor to provide security for stability forces by means of its extensive combat capabilities.

The IBCT cannot conduct forced entry, but it provides the joint force commander an improved, early-arriving capability to immediately begin operations to shape the battlespace and execute decisive action to expedite conflict resolution. Once committed, the robust IBCT can sustain operations for up to 180 days without relief. Capable across the full spectrum of conflict and range of operational

environments, the IBCT can stabilize crises and set the conditions for early decisive action. In many cases, the IBCT can achieve early decision, and its capabilities will add an additional element of deterrence that might prevent many crises from arising in the first place.

The IBCT organization is expandable through either augmentation or scalability in accordance with the factors of mission, enemy, troops, terrain, time, and civilians (METT-TC) in any given contingency. The organization includes the command, control, and communications (C3) "hooks" necessary to permit rapid integration of additional, enabling capabilities, particularly for operations outside the scope of SSCs, such as SASOs and MTWs.

As a prelude to the Interim Force, the Army has initially established a two-brigade force at Fort Lewis to begin fielding the IBCT capability. Once organized, trained, and equipped in accordance with the IBCT Operational and Organizational (O&O) concept, these initial brigades will provide the first operational capability of the Interim Force. Upon fielding of the first IAVs, these units will be designated as IBCTs. Eventually there will be up to eight IBCTs in the Army force structure, at least one of which will be an Army National Guard (ARNG) brigade. By March 2005, we expect to be able to field an Interim Division.

## The Interim Division

Studies suggest that IBCTs, although designed for easy integration into light or heavy divisions, are even more



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flexible and useful in an Interim Division. Such a structure provides a strategically responsive force capable of initiating earlier decisive operations, coordinating multiple, simultaneous SASO requirements, providing the C4ISR and precision fires that enable precision maneuver and information superiority and functioning as an Army Forces (ARFOR) Headquarters in joint operations. The Army will continue to develop and study command and control structures that make the best use of the Interim Force capability.

## **Command and Control**

The IBCT normally fights under a division but can also fight under the direct control of a corps headquarters within a joint or combined command. A corps will probably act as the ARFOR Headquarters and possibly as the Joint Forces Land Component Command (JFLCC) and/or Joint Task Force Headquarters. In many contingencies, the IBCT will (initially) be the single U.S. maneuver command operating under the ARFOR/JFLCC, although other coalition elements might also be present. In either case, if the employing headquarters is not already in place, it must deploy lead elements of its command, control, and communications (C3) structure in order to establish the C3 framework required for effective initial operations. The IBCT is dependent upon the division and higher echelons of command for reachback linkages to expand its access to information, intelligence, joint effects, force protection, and sustainment. The IBCT's design also enables integrated employment of forces; it is fully complementary to and

compatible with U.S. Marine Corps and U.S. Air Force expeditionary units.

## **Legacy Force**

Current Army forces and those capabilities that will be fielded in the near term are referred to as the Army's Legacy Force. They are the finest land combat forces in the world today. Although the operational environment is changing in ways that limit their utility across the full spectrum of requirements, the Legacy Force will continue to be relevant long into Transformation. Its proven capability, despite some needed improvements in deployability and sustainability, is the war-winning basis for simultaneously transforming the Army and meeting America's diverse security requirements. With selected modernization to maintain combat overmatch, recapitalization to improve readiness, and insertion of new, more efficient technologies to reduce operating and sustainment costs, the Legacy Force provides the margin of security that allows us to undertake Transformation.

The Legacy Force was explicitly designed to have a decisive edge over a well-defined, conventional adversary in a mature, well-known theater of operations. The major systems within the force, the "Big Five" of the 1980s—the Abrams tank, the Bradley Infantry Fighting Vehicle, the Apache attack helicopter, the Blackhawk utility helicopter, and the Patriot air defense system—represent a triumph of American arms for that era. That fleet of critical combat systems is reaching or exceeding its expected service life, demanding in turn a fundamental

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business decision regarding their retention in light of the new operating environment. We must decide whether to maintain them until they can be replaced, to recapitalize them by rebuilding and/or selectively improving their capabilities, or to divest them from the force and replace them with modernized systems. The confluence of a changing environment and critical points in the life cycles of major combat systems offers both tremendous opportunity and enormous challenges.

Sustaining our current qualitative edge throughout Army Transformation must remain a priority. As we pursue leap-ahead capabilities that enable new ways to fight, we must retain capabilities that assure decisive dominance for both MTWs and SSCs. This reality demands that the Army's resourcing strategy for Transformation maintain a careful balance of old and new systems that sustains readiness for today while preparing for the future. This strategy embodies a capabilities-based approach to new operational and organizational constructs, synchronizes divestiture with acquisition, selectively retains or extends the life of legacy systems, and brings on new systems as rapidly as possible.

All of the Army's major combat systems have benefited from capability upgrades through product improvement more than once. Additional product improvements could continue to improve their overmatching combat capabilities, but the basic structures are fatigued, producing a predictable impact on readiness.

Assuring the availability of this aging fleet will require an ever-larger quantity of repair parts and additional logistical infrastructure, making sustainment operations more difficult and expensive. A particular problem relates to Combat Support and Combat Service Support systems, since a majority of these systems exceeds the DoD half-life standard and have not been upgraded. At this point, the requirement is to balance current operational risk and investment in future capabilities by prudent recapitalization through complete rebuild of selected systems and selective capability upgrades. Such a Legacy Force recapitalization program will extend the service lives of essential combat weapons, allow insertion of technological developments to make them more efficient to operate and maintain and selectively upgrade those capabilities that produce required combat overmatch. Recapitalization must be selective and must be based on warfighting needs, probable missions and operating environments of organizations, and readiness of the force. The high cost of a wholesale, across-the-fleet modernization effort would consume resources needed to develop the leap-ahead capabilities of the Objective Force.

The Army's chosen Transformation strategy accepts prudent risk in the Legacy Force, where we will maintain both the capabilities and readiness necessary to carry out our part of the NMS. The Transformation strategy applies to the RC as well as to the AC, to the light forces as well as to the heavy forces. It is fundamentally different from previous concepts of modernization, which gave the newest

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equipment to selected high-priority units and assumed that all like forces would eventually have exactly the same equipment and organization. This new strategy focuses on achieving and maintaining the capabilities required to assure dominance in carrying out all tasks but accepting risk in some parts of the force where it is prudent to do so. Specifically, this *Modernization Plan* focuses selective upgrades and modernization on some key organizations while rebuilding and maintaining existing capabilities in others. ARNG and U.S. Army Reserve (USAR) units that are paired with AC units will be selectively modernized, recapitalized, or rebuilt to attain full interoperability and compatibility with their AC teammates.

At the upper end of the risk scale, fighting and winning MTWs requires the ability to mount a decisive joint offensive or counteroffensive campaign. The Army's analysis indicates that, to be decisive, the ground portion of such an effort requires a minimum of five divisions under corps-level joint task force command and control. Significant portions of the Army are forward-deployed in or near particular theaters, where they serve as early-arriving containment forces. Assembling the force required for decisive counteroffensive operations anywhere in the world calls for a three-division corps, with an armored cavalry regiment, designated as the central piece for the counteroffensive effort by the Counterattack Corps that will include the forces that arrived earlier.

To meet this need, the Army will selectively modernize and recapitalize

the III Corps headquarters and support structure, the 3rd Armored Cavalry Regiment, and three AC heavy divisions. This includes those echelons above division (EAD) units assigned to III Corps, including RC units. The forward-deployed and early deploying contingency forces, along with the prepositioned equipment sets that support them, will be recapitalized as needed to meet the threat they face. RC forces will maintain capabilities compatible with the units that they support.

The Army's Transformation strategy for the Legacy Force also includes light forces. A major goal of light force recapitalization and modernization is to close the gap that exists in lethality, survivability, and tactical mobility between their capabilities and those of the heavier forces, making them capable of employment in a wider range of situations. Some of these aims are being achieved as light units convert to the Interim Force design. For those forces that will remain light, we will focus on improving their capability for forced entry operations and for operations in urban terrain. Doing so requires improving their situational awareness and lethality while reducing the weight that they carry and solving the problem of power sources that do not overburden the soldier or the logistical system.

This strategy will sustain the essential capabilities of the Army during transition to the Objective Force, underwriting national security requirements and positioning the Army to fully transform when capability comparable to that of the Legacy Force is resident in the Objective Force. The

Legacy Force—including Active, Guard and Reserve forces—will begin progressive transition to the Objective Force structure beginning in approximately 2008. For the immediate future and well into the midterm, the Legacy Force, along with the Interim Force as it is fielded, will be the force of choice by which the Army fulfills its readiness responsibilities to the Nation.

## Transformation Timeline

Transforming the Army will be a lengthy process, with the exact timing depending on technology readiness, funding levels, and unit availability. The Transformation Timeline provides additional information (Figure 5).

**Initial and Interim Capability Phases.**  
The Initial Phase has already begun.

The major objective of this phase is the reorganization and fielding of two initial brigades at Fort Lewis during FY00-02. Concurrently, the Army will be investing in the Objective Force through increased S&T funding. The goal of this S&T investment is to accelerate the scientific process and enhance the quality and the quantity of the technological solutions to achieve the force characteristics and operational capabilities of the Objective Force. The Interim Capability Phase focuses on complete fielding of the Interim Force, composed of six to eight IBCTs, including at least one ARNG brigade. This phase begins with the fielding of the first battalion with the IAV and ends when the last IBCT is fully manned, equipped, and trained to possess the capabilities described in the IBCT O&O. The Interim Force will bridge the gap between today's capabilities and the Objective Force.

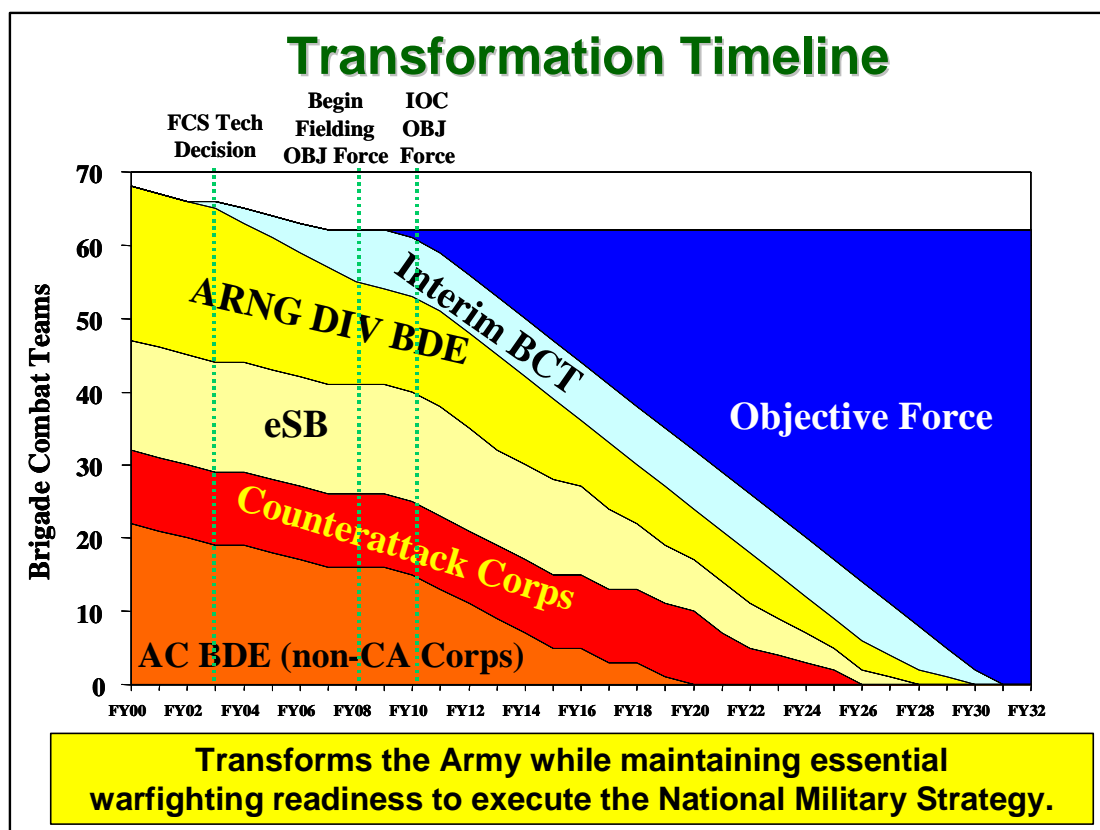


Figure 5. Transformation Timeline

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As such, it will be a full spectrum capable force and will eventually extend beyond brigade echelon, to include Interim Division capabilities. Additionally, selected recapitalization and upgrade of necessary Legacy Force units and systems preserves required near-term capabilities.

**Objective Capability Phase.** This phase of Army Transformation will begin when the first Objective Force brigade-sized unit is fully manned, equipped and trained to achieve the capabilities as described in the Objective Force O&O. It will end when the Army is totally converted to the Objective Force capability.

## The Joint Framework

The factors that drive change in the Army have a similar impact across the entire U.S. armed forces. Consequently, all the Services and the joint community are earnestly investigating the requirements of future battle. An in-depth understanding of the future joint framework is critical to derive the core operational concepts and capabilities for the Objective Force. That understanding begins with *JV 2020*, which is intended to guide joint and Service efforts to prepare for future conflict.

The Army Vision and Transformation are fully nested within the stated goal of *JV 2020*, “. . . the creation of a force that is dominant across the full spectrum of military operations—persuasive in peace, decisive in war, preeminent in any form of conflict.”

The Joint Vision recognizes that to be faster, more lethal, and more precise than today, we must continue to invest in and develop new military capabilities. *JV 2020* identifies four core operational concepts: Dominant Maneuver, Precision Engagement, Focused Logistics, and Full-Dimensional Protection; and two universal enablers, Information Superiority and innovation via advanced technologies, as a macro framework for the identification of required capabilities and the conduct of future joint operations (Figure 6).

Army forces are often associated primarily with Dominant Maneuver. In actuality, Army capabilities are essential to achieving all of the concepts and associated capabilities defined within the *JV 2020*. The Army’s consistent call over the past several years for increasing interdependence within the future joint force reinforces the idea that no single Service has a monopoly on any part of *JV 2020* nor on the conduct of future joint campaigns. Leap-ahead improvements in Army force capabilities to achieve the Objective Force will help assure realization of the *JV 2020*—a conclusion strongly supported by recent Army and Air Force futures wargames employing Objective Force-like ground forces. In fact, without modernized ground force capabilities, significant elements of the future joint concepts embodied within *JV 2020* will be underrealized or left out of reach.



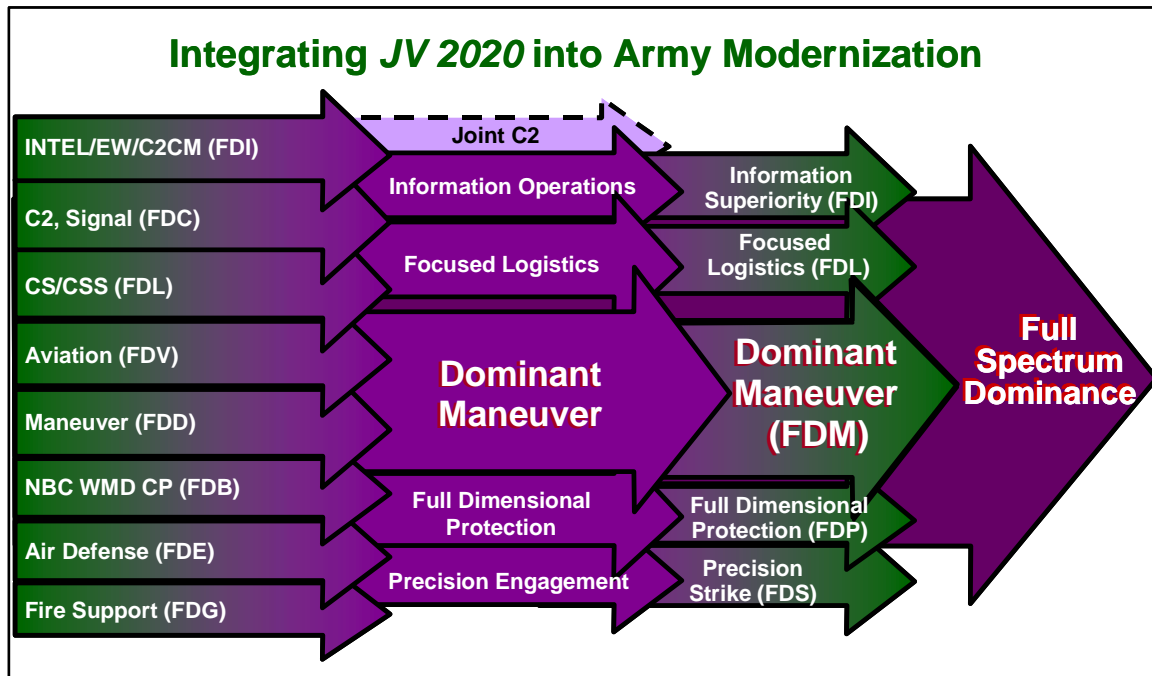


Figure 6. Integrating JV 2020 into Army Modernization

In addition to the imperative for the Army to field combat capabilities to implement *JV 2020*, it likewise remains essential that Army forces emphasize interoperability with allies and partners in future combined contingencies.

Related to this critical need for interoperability, the Army also embraces the goal of joint development of systems in conjunction with other Services, especially the U.S. Marine Corps.

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## ARMY MODERNIZATION

Modernization is a continuous process of integrating new doctrine, training, organizations, and equipment to develop and field warfighting capabilities for the Army in its ongoing mission to fulfill its responsibilities to the Nation in executing the NMS and all assigned missions. Modernization activities are facilitated and optimized by sound Modernization and Investment Strategies designed to implement the Army's Transformation efforts. The Modernization and Investment Strategies establish common terms of reference for modernization activities and provide necessary focus for equipment expenditures.

The overall Army Modernization Strategy is directly focused to support Transformation to ensure that essential capabilities are developed for the future. At the same time, it provides the greatest capability possible for the current force, which remains the foundation of the Army's readiness to fulfill its enduring and nonnegotiable contract with the American people—to fight and win the Nation's wars.

The Investment Strategy in support of modernization describes the process used in deciding how to spend monies to ensure we obtain the best capability for each dollar spent.

### Modernization Strategy

To support the goal of transforming the Army into a more responsive and dominant force in the future, the Army's Modernization Strategy begins by focusing on the three paths or

vectors of Army Transformation—the Legacy Force, the Interim Force, and the Objective Force.

Equipping each force is supported by programs in the following categories—modernization, recapitalization, and maintenance. In the longer term, equipping will also result from investments in S&T, which will explore the realm of the possible for future systems. The Army will ultimately have a common organizational design for all components—AC, ARNG, and USAR—built around a new generation of systems that are deployable on C-130-like aircraft. The desired end state is a more strategically responsive Army that is more capable of dominance along the full spectrum of military operations in a joint and combined environment.

As part of the Army's program analysis and to assist in establishing the funding rationale for systems, the Modernization Strategy seeks to determine if a system is part of the Legacy, Interim or Objective Force or a combination of these forces. The Modernization Strategy, as well the supporting Investment Strategy, is always focused on building combat-capable units. Two important processes—Unit Set Fielding (USF) and Total Package Fielding (TPF)—make building combat-capable units a reality, and they are described below as critical components of the Modernization Strategy.

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## Modernization Tenets

The three broad components of the Army's Modernization Strategy are:

- I. **Focus science and technology to enable timely fielding of the *Objective Force* and, in particular, the Future Combat Systems (FCS), which will be the foundation of that force.**
- II. **Transform to meet immediate warfighting requirements (Interim Force).**
- III. **Maintain and improve warfighting capabilities of the *Legacy Force* through selected modernization, recapitalization, and digitization, thus ensuring preservation of superiority or combat overmatch at all likely levels of conflict.**

## Modernization Categories

Modernization programs are placed into three basic categories and are then subcategorized based upon the force they are fielded to support. These modernization categories are:

**Modernization**—the development and/or procurement of new systems with improved warfighting capabilities (such as the Comanche helicopter, the IAV, the Crusader field artillery system, the Family of Medium Tactical Vehicles, the Javelin antitank system, the Tactical Unmanned Aerial Vehicle, and other new items being procured to meet existing and future requirements).

**Recapitalization**—the rebuild and selected upgrade of currently fielded systems to ensure operational readiness and a zero-time/zero-mile system.

Within recapitalization, there are two subcategories:

1. **Rebuild**—referring to a process that restores a system to a like-new condition in appearance, performance, and life expectancy and that inserts new technology to improve reliability and maintainability.
2. **Selected Upgrade**—referring to the rebuild of a system and the **addition of warfighting capability** improvements to address capability shortcomings (such as the M1A2 Abrams, the M2A3 Bradley Fighting Vehicle, the Patriot air defense missile system, the AH-64D Longbow Apache helicopter, the CH-47F improved cargo helicopter, the UH-60L+ helicopter, and other items due to undergo qualitative upgrades—often results in change in model number).

**Maintain**—repair or replacement of end items, parts, assemblies, and subassemblies that wear or break.

## Modernization Processes

There are two important processes that are integral to the execution of the *Army Modernization Plan*. These processes are **Total Package Fielding** and **Unit Set Fielding**. They are also aided by a **Balanced Modernization** approach, which attempts to

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synchronize fieldings in the most effective manner.

**Total Package Fielding (TPF)** forms the foundation of successful Unit Set Fielding (USF) and is the Army's process to effect a total system fielding of new and modified equipment. It provides for the concurrent fielding of a single system and all its required support. The process aims at minimizing the logistics burden on the gaining unit.

**Unit Set Fielding** is TPF by unit sets. It refers to both a strategy and process that modernizes the force through a family of systems approach to fielding. It involves the assembly and issuance of several individual, interactive systems as a set to a particular unit within a specified time period. (Previously, the term "Brigade Set Fielding" was used in this context, but the terminology has been replaced by "Unit Set Fielding" to be more inclusive of all units involved in this process.) **USF, therefore, focuses on fielding enhanced capability instead of individual systems.** This approach requires the synchronization of individual system fielding plans into a single unit fielding schedule that matches system interdependencies, deconflicts demands on soldiers, and ensures operational requirements remain the top priority. The goal of USF is to produce combat-capable units with greater capabilities in the shortest period of time with minimum risk to operational availability. USF is not practical for all units and Components in brigade sets. Particularly for CS/CSS units—primarily those in the RC—USF may be executed by battalion, separate

company or team/detachment-sized elements.

## Balanced Modernization

Balanced Modernization is the approach of synchronizing fieldings to ensure maximum optimization of both complementary and dependent system capabilities. Balanced Modernization works both within and across the Army's functional systems and within the framework established by *JV 2020*. Although it is focused on the timely fielding of systems designed to interoperate with one another, it also encompasses the concept of force integration by synchronizing a total Doctrine, Training, Leader Development, Organization, Materiel, Soldier (DTLOMS) solution with required infrastructure changes and funding to ensure the proper fielding of a new capability. Of particular importance is the development of training aids, devices, simulators and simulations (TADSS) along with the allocation of required training funds to maximize the Army's utilization of new system capabilities.

A balanced approach ensures that the most effective capability is achieved through the efficient investment of resources. The Army may enhance its capability by fielding a fewer number of systems if it includes all enablers including training devices, ammunition, ranges, spare parts, and personnel. An M1A2 System Enhancement Program (SEP)-equipped armor battalion may achieve less than 100% of its potential capability if all the enablers are not available. The Army may be better off investing some of the end item procurement resources into the

enablers and field fewer tanks, yet achieve more capability. The balanced Modernization Strategy (Figure 7) also serves as the core component of the Investment Strategy and assists in determining the appropriate level and allocation of investments across the modernization categories.

## Investment Strategy

The **ultimate purpose and goal of Army modernization is to build and maintain multifunctional, combat-capable units** using a USF process. The nature of the planning, programming, and budgeting system requires that combat unit components (people, equipment, etc.) be managed as single entities. It is the whole unit, however, that remains our focus. The objective is to achieve an operational capability that satisfies mission needs. The challenge inherent in building combat-capable units through the application of integrated components

(such as weapons platforms, communications equipment, and ammunition) and the necessary associated functions (leader training, training devices, and installation support) is the achievement of synergism and complementary results in the units.

Fielding even one new weapon system is a complex and multifaceted task. In addition to the actual new or modernized systems, fielding involves the delivery of personnel, training, support systems, associated doctrine, manuals, and training aid. The old way of doing business, managing individual systems through “stovepipes,” has evolved toward a systems-to-unit or family-of-systems approach. Other Services have long recognized the importance of defining the capability of their force by enhancing complete units. The Army also has recognized the significance of coordinating the capability improvements of its units.

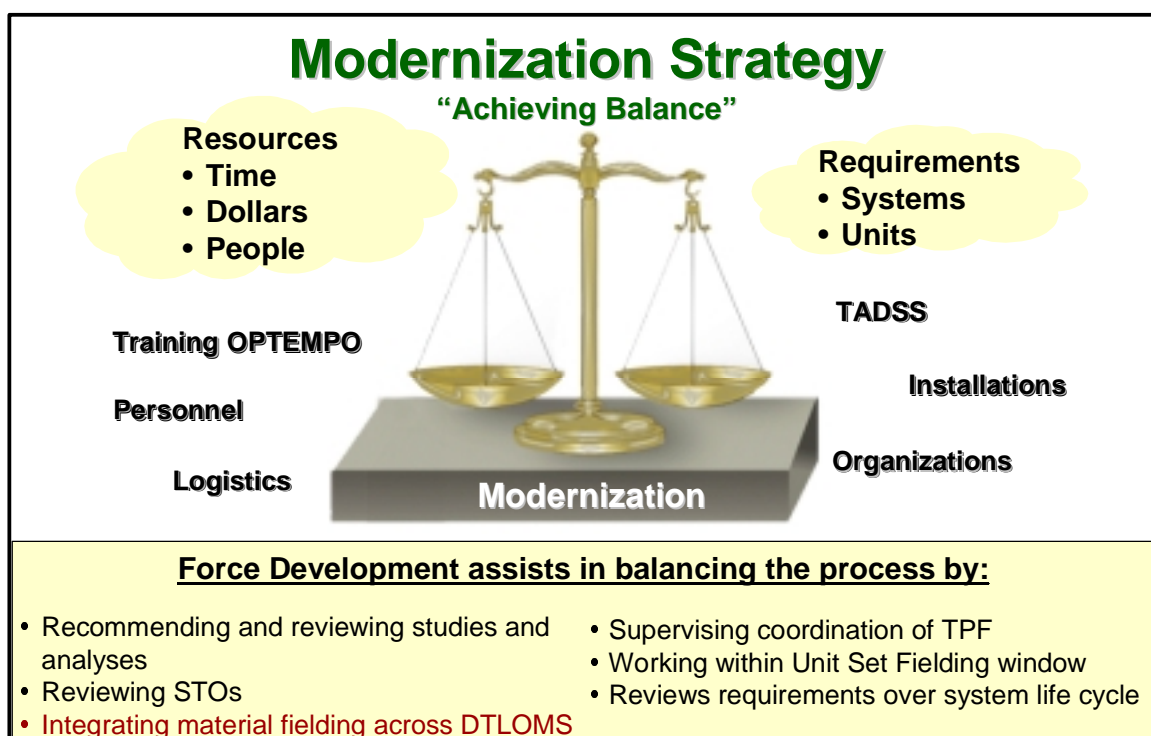


Figure 7. Modernization Strategy



To implement the Modernization Strategy in support of Transformation, the Army prioritizes its investment of limited resources over time. The number one priority for Army investments is the development of the FCS, the foundation of the future transformed Army. At this point, that investment takes the form of S&T efforts to explore, identify, and develop the revolutionary technologies needed to make the FCS a reality. Of the Army's total S&T funding, 96% directly supports programs needed to develop Objective Force technologies, and 37% of this amount specifically supports FCS. Within the Army's RDA expenditures during the planning years FY02-07, which are the basis for financing overall modernization, approximately 62% of the total funding is also dedicated in support of the Objective Force and systems that will be a part of the Army of the future.

To enable this focus on the future, the Army is investing in the modernization of the current Legacy Force and the

fielding of the smaller Interim Force to the amount necessary to preserve sufficient readiness and warfighting capabilities until new Objective Force systems can be fielded, which is expected to begin in approximately 2008 (Figure 8). The transition to the Objective Force is expected to be a continual process lasting up to twenty years. The Army has already begun this process by shifting its investment priority to focus on leap-ahead technologies needed for the Army of the future. It remains essential, however, to invest adequate funding in the readiness and capability of the forces that will be available in the immediate future to support the NMS and associated military operations. This investment will be limited to that which is necessary to maintain critical capabilities and, as the Objective Force begins fielding, these investments will be minimized even further and older equipment allowed to age until eliminated from the force. Overall, the Army's plan to transform itself into a more responsive,

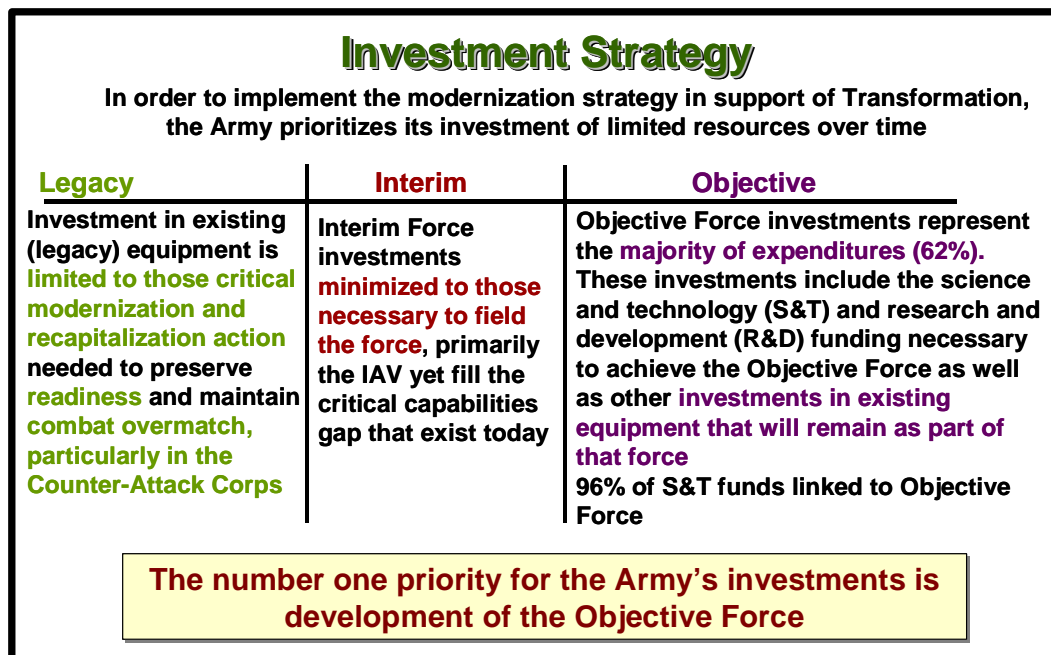


Figure 8. Investment Strategy

deployable, agile, versatile, lethal, survivable, self-sustaining and dominant force for all future military operations is supported by the revised Modernization and Investment Strategies that focus on future potential while still preserving current warfighting readiness.

To support the ongoing and future Transformation, the Army has already made significant changes in its plans and resourcing. Approximately \$16 billion of programmed future spending has been shifted to directly support Transformation initiatives. As mentioned above, the vast majority of S&T spending (96%) is devoted exclusively to developing the new technologies of the future Army, with the greatest part of that being for the FCS, the basic foundation of the Objective Force. The requirements for adequately funding the necessary transitional phase of fielding interim combat brigades as well as continuing

to maintain, recapitalize, and modernize the existing Legacy Force stretch available resources. Maintaining sufficient readiness of the existing force while focusing on transforming to a new Army to meet future needs requires a more robust, steady funding stream. Proceeding without this funding involves either the assumption of greater risk in the readiness of the Army to meet current requirements, or costly delay in the transformation to a more responsive and dominant Army of the future.

The Army fully recognizes that it operates within a resource-constrained environment and realizes it must first look inward to fund Transformation. In the FY00 and FY01 budgets (Figure 9), the Army cancelled seven programs (Command and Control Vehicle (C2V), Wolverine, Prophet Heliborne, Grizzly, Stinger Blk II, MLRS Smart Tactical Rocket (MSTAR), and Army Tactical Missile System (ATACMS) Brilliant

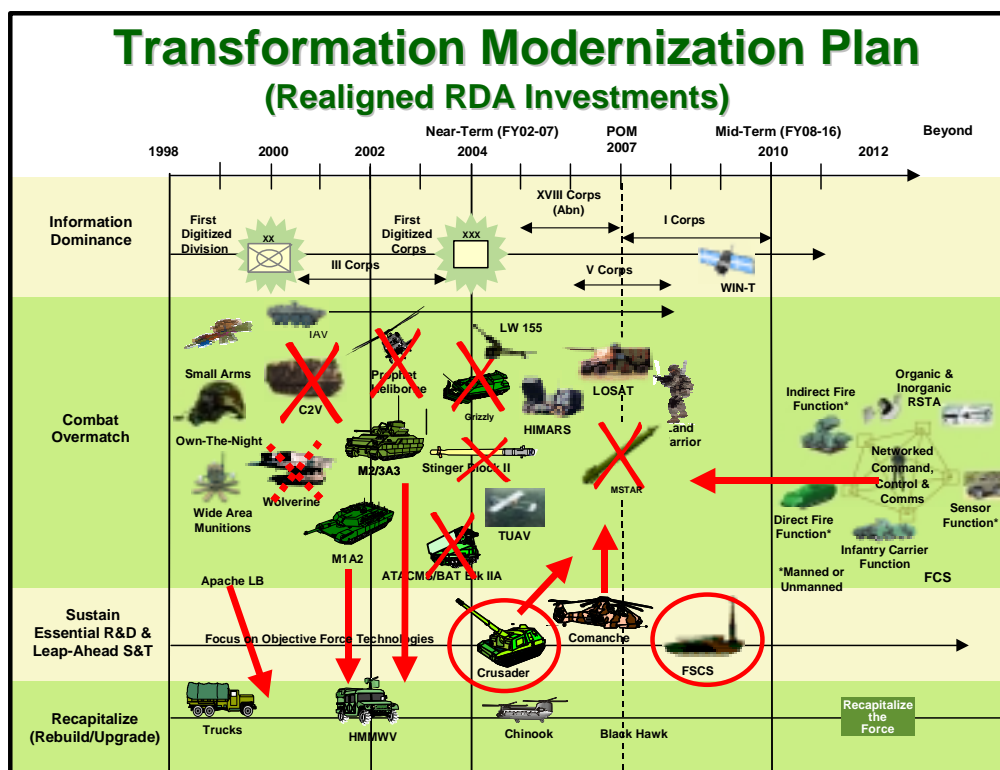


Figure 9. Realigned RDA

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Anti-Tank (BAT) Blk IIA) and restructured two others (Future Scout Cavalry System (FSCS) and Crusader), thus sacrificing needed capabilities. In the PB02, the Army has continued making hard choices to fund Transformation by canceling or restructuring five additional programs. Overall, the new Army Investment Strategy represents a paradigm shift from weighting efforts to resource existing systems and technologies to resourcing systems and technologies that will support the transformed Army in the coming decades.

## Objective Force

Within the overall Investment Strategy, the critical path of the Transformation leads to the Objective Force. Today, the S&T community is working hard to develop answers to questions we have asked: How do we reduce armor volume in combat vehicles while increasing survivability? How do we increase deployability without sacrificing survivability and lethality? How do we reduce the logistics footprint in the battlespace and thereby reduce strategic lift requirements, and how do we reduce the total cost of logistics without jeopardizing combat capability? These and other questions guide a major S&T effort to develop technologies that will give the Objective Force its desired characteristics of responsiveness, agility, versatility, deployability, lethality, survivability, and sustainability.

Our challenge to the S&T community is to return with a comprehensive set of technological recommendations and R&D plans by 2003. On that basis, the Army will make technological

readiness decisions that we believe will lead to several additional years of engineering and development before the new technologies are produced. When the technologies are mature and when the production lines are ready, we will field the Objective Force in unit sets. Organizations will field complete suites of new, thoroughly integrated systems that achieve the capabilities outlined in the Army Vision.

Transformation to the Objective Force will eventually encompass the entire Army. The Legacy Force begins transforming to the Objective Force, followed by the Interim Force. Over the course of ten to twenty years, the Army will completely transform itself into the Objective Force. The culminating phase of this effort is the achievement of Objective Force capabilities. Comanche and a family of FCS will enhance these force characteristics. The FCS is envisioned as a digitized system-of-systems land combat capability with multimission functionality. PB02 funds the required S&T investment and engineering and manufacturing development (EMD) that will permit production of the FCS. Simultaneous with FCS development, the Army will mature other essential Objective Force technologies for full spectrum operations. These include key survivability technologies such as action protection, signature management, and advanced armor. In addition, survivability is closely linked to lethality, which is being actively pursued in the development of precision-guided munitions, directed energy weapons, and electromagnetic multi-role munitions capabilities. This process also requires advances in fuel-efficient propulsion (ground vehicles

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and rotorcraft), compact electric power generation, advanced simulation, and medical and soldier system technologies. The Army will seek paradigm shifts in warfighting capabilities as significant as past shifts in tank and helicopter technologies.

The **capabilities for the Objective Force** considered necessary in the projected operational environment are:

- Improved operational force autonomy, with reductions in demand for fuel, spare parts, and munitions.
- Increased responsiveness, accuracy and lethality of supporting lethal and nonlethal fires for a full range of fire support missions.
- Improved networked C4ISR links between sensors and shooters for all weapon systems and platforms.
- Improved sensors to see the full range of operational variables—terrain, weather, friendly and enemy force, noncombatants—and detect threat actions in all weather conditions.
- Unmanned air and ground systems as reconnaissance/surveillance, attack systems, and other battlefield functions.
- Current or enhanced level of survivability.
- More strategically deployable force capable of fighting upon arrival.
- Improved early warning and intercept of enemy ground- and air-launched conventional and smart weapons—missiles, rockets, cannon, and smart munitions.

- Improved warning of chemical and biological hazards for avoidance and identification.
- Improved non-line-of-sight (NLOS) communications for use in restricted, urban, or complex terrain.
- Improved information protection for C4ISR networks.

To obtain the Objective Force as rapidly as possible, the Army will maximize use of the Simulation and Modeling for Acquisition, Requirements and Training (SMART) initiative. SMART capitalizes on modeling and simulation (M&S) tools and technologies to address system development, operational readiness, and life-cycle cost and is accomplished through the collaborative efforts of the requirements, training and operations, and acquisition communities. SMART is a framework to provide a disciplined, collaborative environment to reduce costs and time required to provide solutions to Army needs. Key components are the ability to exchange data, algorithms, software, and other information. SMART yields four significant benefits that are of paramount importance to Army Transformation:

1. Reduced total ownership costs and sustainment burden for fielded systems throughout their service life.
2. Reduced time to explore concepts and develop and field new or upgraded systems.
3. Increased military worth of fielded systems while simultaneously optimizing force structure, doctrine,

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tactics, techniques, and procedures.

4. Concurrent fielding of systems with their training devices.

## Science and Technology (S&T)

Focused and sustained investments in RDA are essential for and inseparable from enhancing force capability and strategic responsiveness. To maintain the technological superiority of our current forces and align near-term S&T programs that maximize required interim capabilities, the Army long-term S&T programs focus on revolutionary technologies designed to deliver materiel and equipment during the later stages of the Transformation process. For example, near-term development of robotics technology involves use of leader-follower sets (manned-unmanned) to decrease vehicle manning and size-weight requirements. Long-term S&T will provide autonomous robotic vehicles capable of such functions as reconnaissance and surveillance missions and fires and effects missions in extreme, dynamic, or hostile environments.

The S&T strategic goal is to help the Army eliminate, as much as possible, the current distinctions between heavy and light forces and achieve a single Objective Force.

To accomplish this goal, the S&T program will:

- Develop technologies and prototype systems for FCS and other Objective Force systems.
- Pursue innovations to achieve leap-ahead capabilities.

- Identify and leverage the best sources of technology for the Army.

## Objective Force Technology Areas

Although FCS is the main thrust of the S&T program, it represents only about one-third of all S&T funding. Most of the Army S&T program is focused on pursuing technologies that support the Objective Force as a whole. The Objective Force technology areas are described as follows:

- **Future Combat Systems.** FCS is a combat team-of-teams and system-of-systems involving mounted and dismounted teams, manned and unmanned systems, and air and ground components, all linked within a network of C4ISR and fires. It is capable of closing with and destroying the enemy by fires, maneuver, and assault, and is also capable of seizing and controlling terrain.
- **C4ISR.** Research and technology to enable comprehensive situational awareness for the Objective Force. This includes advanced sensors and sensor processing, intelligence and electronic warfare systems and techniques, militarized and special-purpose electronics, countermine technologies, and C4 system technologies.
- **Basic Research.** Investments in the exploration of fundamental phenomena that have significant potential to enhance future land warfare capabilities in areas such as armor materials by design, nanoscience, biomimetics, compact power, smart structures, miniature and multifunctional sensors, and soldier performance.



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- **Medical.** Research and technology to protect and treat warfighters to ensure worldwide deployability, increase warfighter availability, and reduce casualties and loss of life.
  - **Lethality.** Technologies are needed to provide FCS tactical and operational ranges of lethal and nonlethal effects delivered by organic FCS means against line-of-sight (LOS), beyond-LOS (BLOS), and NLOS targets. Technologies are needed to provide FCS with a common weapon, significantly reducing the ammunition logistics burden while paradoxically providing for a high volume of fires at sustained rates with long gun-life and manned by smaller crews. FCS requires both high- and low-velocity fires and precision-point munitions, but also precision-in-area munitions, delayed munitions, smart and brilliant munitions for use within highly restrictive Rules of Engagement (ROE) environments. Technology must provide overmatching lethal capabilities to destroy heavy and light armor, bunkers, personnel, and air threats such as Unmanned Aerial Vehicles (UAVs) and rotary-winged aircraft, as well as provide for obscuration, proactive counterfire, command and control (C2) disruptions, and creation of obstacles.
  - **Rotorcraft.** Research and technology to enhance the performance and effectiveness of future rotorcraft, including rotors and structures, propulsion and drive systems, avionics and weapons and human-systems integration (e.g., crew station) technologies.
  - **Future Warrior.** Technologies to support the future infantry soldier, including enhanced ballistic protection, clothing and equipment, dismounted warrior C4, compact power and power management, sustenance and nutritional enhancements, soldier weapons, and warrior technology integration.
  - **Focused Logistics.** Technologies to enhance deployability and reduce logistics demand. Examples include precision roll-on/roll-off air delivery, technologies for airfields and pavements to support force projection, 21st century truck, and robotics to support resupply and reduce demand for food, fuel, and water.
  - **Personnel Technologies.** Advanced training tools and methods to enhance warfighter and commander abilities and performance; advanced human engineering concepts to ensure human-system physical compatibility and cognitive engineering concepts to avoid information overload and optimize task allocation to enhance warfighting effectiveness.
  - **Survivability.** Technologies that in the aggregate, along with organizational designs and doctrine, provide survivability of mission capability, organizations, platforms, and individual soldiers. Included within this category are technologies permitting the FCS-based Objective Force to first see, first decide, and first shoot, thereby eliminating threats to force survivability. Also included are technologies that enable organizations, platforms, and

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soldiers to avoid detection, acquisition, hit, penetration, and kill.

- **Advanced Simulation.** Simulation tools to provide increasingly realistic environments and systems to support acquisition, requirements, and training. This includes technologies for networked simulations, embedded training, constructive simulations, virtual environments, and range systems for live use.

### **FCS Concept**

Developing the FCS is the Army S&T community's unconditional highest priority. The FCS represents the central materiel solution to achieving the Objective Force capabilities. The intent is to develop and field a generation of combat systems that will blur current distinctions between heavy and light forces. It will solve the challenges of making heavy forces lighter, making, lighter forces more lethal, and reducing logistics demands.

The FCS is not "a" system. Rather, it is a system-of-systems that collectively exceeds the capability of any of its components. The Army is not developing "a" tank or "an" artillery system or "an" infantry center. It is developing new concepts and designs to challenge these traditional platform-centric approaches. Achieving this goal will enable a true paradigm shift—as significant perhaps as the development of the tank and the helicopter themselves.

The FCS systems approach envisions a grouping of capabilities into five major functional areas (1) direct fire, (2) indirect fire, (3) infantry assault, (4) intelligence and reconnaissance, and

(5) networked connectivity with overmatching synergy of functions.

The primary design characteristics of the FCS include networked C2 on-the-move, BLOS "direct fires," advanced long-range precision indirect fires, standoff sensors, and robotics. In addition to the technical challenges within these functional areas, there is a total system design constraint for weight that is approximately 20 tons maximum per vehicle, and for volume—that of the current C-130. This is a very stringent but realistic measure of performance. The C-130-like transportability constraint for the FCS is the prime system characteristic to achieve the increase in strategic responsiveness stated in the Army Vision.

The Army, Defense Advanced Research Projects Agency (DARPA), and others will be developing a number of enabling technologies for FCS. In the case of the Army, these technologies will be transitioned either through planned Advanced Technology Demonstrations (ATDs) to the baseline FCS program, or as a future FCS preplanned product Improvement (P3I). These technologies fall into the major areas described below:

- **Lethality.** Concepts include lethal and nonlethal LOS and BLOS gun, missile, and directed energy technologies that will allow the instantaneous prioritization, distribution, engagement, and destruction or neutralization of multiple targets. Representative programs include Compact Kinetic Energy Missile, Multirole Armament and Ammunition ATD, Direct-Fire Lethality ATD, and Modernized Hellfire/Common Missile.

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- **Army/DARPA Collaboration.**

These investments represent the Army's contribution to the memorandum of agreement (MOA) between the Army and DARPA to collaboratively develop the FCS. The MOA was established in February 2000. The Army/DARPA FCS MOA outlines an S&T program leading to seamless transition of an FCS design and prototype demonstrator to system development and demonstration (SDD) in FY06. The SDD transition milestone is an integrated demonstration to assess FCS ability to achieve the FCS O&O concept and mission needs. Key to the program's success is the simultaneous development of the operational concepts, requirements, and critical enabling technologies for achieving FCS combat overmatch capabilities.

- **Survivability.** Survivability is the primary technology challenge for a C-130 transportable ground combat system. To survive a first-round engagement, individual FCS platforms will require new approaches to hit avoidance and crew protection. Overall force survivability will require unprecedented battlespace situational understanding and standoff neutralization capability. Representative programs include Full Spectrum Active Protection, Lightweight Armor, Signature Management Technology, and Vehicle-Mounted Mine Detection.
- **C4ISR.** Concepts include on-the-move distributed C2; multifunction sensors and sensor fusion algorithms; and development of a

seamless Tactical Internet within and between units, leaders, soldiers, platforms, and sensors. Representative programs include Future Scout and Cavalry System ATD, Agile Commander ATD, Multifunctional On-the-Move Secure Adaptive Integrated Communications (MOSAIC) ATD, Tactical C2 Protect ATD, and Integrated Situational Awareness and Targeting ATD.

- **Mobility.** Concepts include electric drives, pulsed power generation, hybrid propulsion, fuel cells, low-power demand electronics, and efficient power management. Representative programs include Combat Hybrid Power System (CHPS) and Ground Propulsion and Mobility.
- **Function Integration.** This investment provides for the integration of Army-developed technologies into the DARPA-led FCS demonstrator.
- **Robotics.** Unmanned vehicles must be employed to significantly enhance the effectiveness of manned systems. UAVs will increase the ability of forces to see before being seen. Unmanned ground vehicles (UGVs) will provide a significant component of the FCS ensemble and will reduce the risk to soldiers, alleviate personnel requirements for selected support functions, and increase strategic and tactical mobility through reductions in weight and size. Representative programs include the Robotic Follower ATD, Semiautonomous Robotics for FCS, and Demo III.

- **Human Engineering.** Concepts include human-machine interface designs that decrease task complexity and execution times, improve performance levels, and minimize physical, cognitive, and sensory demands; associate systems to offload human operators and enable maximum focus on the highest priority tasks; and embedded/deployable virtual training and mission rehearsal environments. Representative programs include Crew Integration and Automation Testbed, and Intravehicle Electronics Suite.

### **FCS Program**

FCS concept development is underway. Both DARPA and the Army have explored options for meeting the stated program requirements. These studies have indicated that, with the development of a network-centric, distributed combat capability, it will be possible to provide a fighting force that is more lethal, survivable, mobile, and supportable than either our current heavy force or light force.

The FCS concepts, technologies, and system designs will continue until 2003. All three are being conducted in parallel. The Army and DARPA are jointly funding the concepts and systems design work, as well as the higher risk, high-payoff enabling technologies. Additional FCS-enabling technologies are being developed independently by the Army, industry, and others.

2003 is a critical decision year. Using program results to date, Army leadership will decide if the FCS system-of-systems designs and their

associated technologies as demonstrated will fulfill the Army Vision. If so, the program will continue by finalizing the approved FCS designs, bringing the required technologies to the prototype demonstration level, and building and testing an FCS demonstrator. The demonstrator will be capable of performing all desired FCS functionalities described in the FCS mission needs statement. The demonstrator will be completed and tested in 2006.

### **Other S&T**

A small portion of the S&T program is devoted to several programs that do not directly support the Objective Force:

- **Environmental Quality.** Tools and techniques to enhance "green" operations through improved pollution prevention, restoration of contaminated areas, enhanced compliance with environmental statutes and regulations, and effective conservation of resources.
- **Engineering Construction.** Research and technology to achieve critically needed cost reductions in Army facility life-cycle processes (infrastructure planning, assessment, design, construction, revitalization, sustainment, and disposal) to improve soldier readiness, safety, and quality of life.
- **Dual-Use S&T.** Co-investment with industry in technologies with both military and commercial applicability, thereby reducing development costs and potentially reducing production costs through shared production lines.

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- **Materials Processing.** Widely applicable, novel techniques for materials processing and production.

**FY02 President's Budget.** To support the Army Vision and accelerate the pace of Transformation to the Objective Force, the Army has increased its S&T funding. PB02 increased funding for S&T by \$197 million. While the Army's FY01 budget adequately funded the necessary S&T to meet our initial Transformation goals, the Army does have more S&T opportunities than we have resources. An additional \$300 million would support funding to expand and accelerate the following technologies: (1) robotics systems (\$100 million), (2) concept definition, modeling and simulation for FCS (\$50 million), (3) untethered options for BLOS precision munitions (\$50 million), (4) kinetic energy missile weapons systems (\$50 million), and (5) electrothermal chemical cannons (\$50 million). S&T funding totals \$8.5 billion in the FY02-07 Plan, of which \$8.2 billion directly supports programs needed to develop Objective Force technologies. Approximately 37% of the Objective Force investment (\$3.0 billion) supports FCS, the cornerstone of the Objective Force.

## Interim Force

Over the past decade, the Army has significantly improved the ability to deploy heavy forces to two MTWs through forward stationing of soldiers and prepositioned equipment. That approach is no longer sufficient, and the Army must make fundamental

changes that enable deployments to locations other than these theaters and for operations of a much wider scope. The deployability of current legacy combat platforms can only be marginally improved. Therefore, the Army will rely upon a combination of enhanced prepositioned equipment and a transformed force to lighten and organize the Army for maximum deployability. A key objective of the transforming Army is to achieve more strategic responsiveness, as it will be structured and equipped for timely, worldwide employment to maximize our deterrent effect and diminish the challengers' opportunity to attain strategic or tactical advantage.

To achieve a very rapid deployment threshold, the IBCT design capitalizes on the widespread use of common vehicular platforms coupled with the minimization of personnel and logistical footprint in theater. With approximately 3,500 personnel and configured ready-to-fight combined arms packages, the entire brigade can complete deployment within 96 hours. It can begin operations immediately upon departure from the airport of debarkation (APOD). It also provides the Joint Force Commander an improved capability to arrive immediately behind forced entry forces, begin shaping operations, and expedite decisions. Operationally, the IBCT normally fights under a division or corps headquarters acting as the ARFOR or JFLCC, within a joint or combined force.

The core operational capabilities of the IBCT depend upon excellent operational and tactical mobility, enhanced situational understanding, combined arms integration down to



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company level, and increased dismounted strength for close combat in urban and complex terrain. Properly integrated, these core capabilities compensate for platform limitations that may exist in the close fight and lead to enhanced force effectiveness.

The primary combat platform is the IAV, and it will serve as the platform for a number of variants. Combat support and service support elements will also be based on a small number of common platforms.

To inform the Army during the early stages of Transformation and to develop doctrine for the new units, the Army began converting two brigades to an initial force design beginning in FY00. These units, built around immediately available surrogate and “in lieu of” vehicles, will convert to the interim design when IAVs are fielded.

**Interim Armored Vehicle (IAV).** On 16 November 2000, the Army awarded a contract for a family of IAVs to equip IBCTs capable of deployment anywhere in the world in a combat-ready configuration. The family consists of two vehicle variants (the Infantry Carrier Vehicle and the Mobile Gun System) and eight additional configurations of the Infantry Carrier Vehicle (Mortar Carrier, Reconnaissance Vehicle, Anti-Tank Guided Missile Vehicle, Fire Support Vehicle, Engineer Support Vehicle, Command and Control Vehicle, Medical Evacuation Vehicle, and the Nuclear, Biological and Chemical Reconnaissance Vehicle).

**FY02 President’s Budget.** PB02 continues funding to field and sustain six IBCTs, including an ARNG unit,

equipped with an off-the-shelf IAV and other off-the-shelf items. The first IBCT is projected to be operational by spring 2003 and the second IBCT by spring 2004. The Interim Force is designed for operational employment and is not experimental in nature. As quickly as possible, we will make it ready to respond to immediate operational requirements, thus providing the National Command Authorities and unified CINCs with enhanced strategic options.

PB02 continues funding for an eventual six IBCTs, which will be fielded in complete brigade sets. To achieve full operational capability for supporting the CINCs, however, a total of eight IBCTs is optimum and remains the Army’s goal.

## **Legacy Force**

The full spectrum of operations demands land forces for a variety of missions within the joint environment. Today’s Army is dominant throughout that spectrum, and we must maintain that dominance. To this end, the Army will retain III Corps as a counterattack force, with both AC and RC forces, as the heavy modernized corps. Organizational changes and equipment program accelerations will increase both lethality and survivability of light and early entry forces. Additionally, recapitalization of critical systems must occur to forestall loss of overmatch in the Legacy Force. Selected upgrades and limited, new procurements will maintain sufficient capability in a robust Legacy Force. This also means that essential echelons above corps (EAC) units required to project and sustain III

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Corps must be modernized to preserve this capability.

Objectives for the Legacy Force, our strategic hedge across the full spectrum of operations, are to:

- Retain today's level of combat overmatch over all potential adversaries.
- Sustain combat power and survivability at less weight and bulk.
- Achieve a commonality among platform, chassis, caliber, component and battlefield operating system that, to the extent possible, responds to a much broader range of operations.
- Reduce the deployed logistical footprint as enablers are identified, funded and fielded.
- Enhance strategic responsiveness.

**FY02 President's Budget.** Selective upgrades include variants of fielded equipment, such as the M1A2 Abrams SEP tank, M2A3 Bradley Fighting Vehicle (BFV), and AH-64D Apache Longbow helicopter.

Modernization consists of new systems, such as the High Mobility Artillery Rocket System (HIMARS); the Comanche helicopter, which will also be the foundational helicopter in the Objective Force; and the Crusader Advanced Field Artillery System, which will provide the critically needed indirect fire support until the entire force (including echelons above divisions) are converted to the Objective Force. In-stride breaching of obstacles remains a critical requirement for the Counterattack

Corps, and Wolverine and Grizzly are the systems designed to meet that requirement. Unfunded requirements for Wolverine and Grizzly in the PB02 total more than \$1.2 billion for the duration of the Future Years Defense Plan (FYDP).

Previous modernization strategies have identified three primary overmatch initiatives—equipment modernization and recapitalization, enhancements to light unit lethality, and improvements to strategic responsiveness. These initiatives enabled the Army to address a capabilities gap caused by the aggressive fielding of the Interim Force and front loading of the S&T effort for the Objective Force. The funding deficit is most pronounced in FY06 and FY07 and is carried largely by the Army Tactical Missile System (ATACMS) Block II, BFV A2 and A3, Lightweight 155mm Howitzer (LW 155), Family of Medium Tactical Vehicles (FMTV), and Multiple Launch Rocket System (MLRS). Modernization priority is the Counterattack Corps. The Army is prepared to assume prudent levels of risk in the remaining Legacy Force and in the Army Prepositioned Stocks (APS). The PB02 underfunds equipment upgrades for the Legacy Force by more than \$14 billion. The selected modernization efforts that are planned and funded, however, are an essential step in reversing the trend of deferring modernization of aging systems. This trend must be reversed to some extent in order for the Army to maintain its ability to provide adequate readiness in support of the National Military Strategy.

**Recapitalization** of legacy equipment is the maintenance and systemic upgrade of fielded systems to ensure operational effectiveness and a near-zero-mile/zero-time system. The objectives of recapitalization include: (1) extending the service life; (2) reducing operating and support costs; (3) improving reliability, maintainability, safety, and efficiency; and (4) enhancing capability. Recapitalization (selective upgrade) includes P3I, extended service programs (ESPs), and major modifications. These programs do not constitute recapitalization unless the system is restored to a zero-time/zero-mile condition. The measure of success in managing fleet age with recapitalization is to achieve and maintain an average fleet age at or below half the system's expected service life. The goal is to achieve DoD service half-life metrics (Figure 10) for selected systems by

2010 and maintain that standard thereafter.

The Army also has a number of refurbishment programs that, while not meeting the technical definition of recapitalization, do significantly improve readiness and must not be overlooked. These life-extension programs effectively enhance unit and system readiness while reducing life-cycle cost. They are more effective when applied to combat support equipment and include AC, USAR, and ARNG units.

For the FY02-07 Plan, the Army makes a down payment on recapitalizing the programs (by reprioritizing among disparate recapitalization and depot maintenance programs) totaling \$15.5 billion against a \$23.0 billion requirement. PB02 initiates but does not fully fund recapitalization programs. As a result, most systems will not reach the half-life goal until 2013 or beyond.

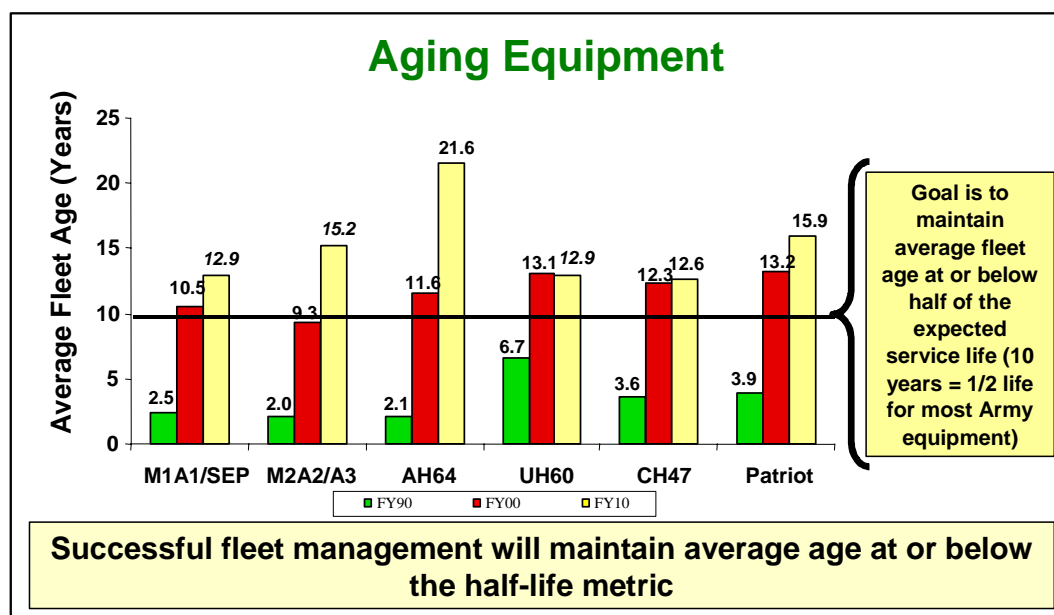


Figure 10. Aging Equipment

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## SUMMARY AND CONCLUSION

Army Transformation will ensure the world's preeminent land force maintains its ability and demonstrated will to fight and win our Nation's wars decisively—now and in the future. Transformation will make certain the Army is capable of successfully executing its assigned missions across the full spectrum of operations with vastly improved lethality, survivability, and sustainability and greatly increased strategic responsiveness and tactical mobility.

Focused on the future operational environment, properly equipped Army units will be fully capable of fighting and winning against any potential adversary in a rapidly changing, unpredictable, and asymmetrical battlefield. The *Army Modernization Plan* outlines the intent and strategy of building these future combat units that will have the agility and versatility to succeed against any opponent. The *Army Modernization Plan* also provides the overarching strategy of maintaining the current force to ensure it maintains its ability to defeat any threat while the Army is transforming itself. As the bridge to the Objective Force, the Interim Force will ensure the Army can rapidly respond to any contingency across the full spectrum of operations with significantly increased responsiveness and deployability. The *Army Modernization Plan* lays out the requirements to fully resource the Interim Force and describes the additional support needed to allow the Interim Force to fill our current warfighting capabilities gap.

The *Army Modernization Plan* focuses modernization through the three paths or vectors of Army Transformation. It also describes the critical modernization processes—Unit Set Fielding and Total Package Fielding—that will facilitate the building of combat-capable units. Although the *Army Modernization Plan* addresses the materiel aspects of modernizing and transforming the Army, it also ensures that modernization is fully coordinated and synchronized across the many doctrine, training, leadership, organizational, and soldier requirements.

The Army has accomplished much since the Army Vision was first announced in 1999. In the Army's FY02-07 budget plan, senior Army leadership made clear that it was ready to take prudent risks and make hard programming and budgeting decisions to make Army Transformation succeed. The Army "killed" seven major systems and restructured two other systems and then used the resulting savings to fund requirements for the Interim and Objective Forces. As a direct result, the Army has established two initial IBCTs at Fort Lewis, which are conducting tough, realistic training with surrogate and loaner vehicles as the Army awaits delivery of the IAV, for which a contract award was announced in November 2000. The Army has also directed significant resources into S&T requirements for the Objective Force. The results to date—the technological advances—have been remarkable. Yet, there is much to do.

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The *Army Modernization Plan* is submitted to Congress with PB02, which continues to implement and fund Army Transformation.

Specifically, the Army's portion of the PB02 submission continues planned funding for the following:

- 68% of the Army Transformation, including six IBCTs as well as development of the FCS.
- USF and sustainment for six IBCTs that significantly enhance current capabilities and provide lessons-learned for subsequent Objective Force development.
- S&T and EMD for the FCS for the Objective Force.
- Key modernization programs like Comanche and Crusader.
- Selected recapitalization programs to enhance legacy system capabilities.

**Significant shortfalls for support of Transformation**, however, continue to exist in PB02 and specifically in the following areas for implementation of Army plans through FY07:

- Legacy Force equipment upgrades (\$14 billion).
- S&T and T&E (\$2.1 billion).
- Other Transformation initiatives (\$13 billion, of which recapitalization is \$7.5 billion, \$3 billion for IBCTs, and \$2.5 billion for training).

The Army has already made major changes in its plans and resourcing in support of ongoing and future

Transformation. Approximately \$16 billion of programmed future spending has been shifted to directly support the Transformation initiatives. The vast majority of S&T funding (96%) is devoted exclusively to developing the new technologies for the future Army, with the greatest part of that being for the FCS, the basic foundation of the Objective Force. The requirements, however, for adequately funding the necessary transitional phase of fielding interim combat brigades as well as continuing to maintain, recapitalize and modernize the existing Legacy Force stretches available resources. Maintaining sufficient readiness of the existing force while focusing on transforming to a new Army to meet future needs requires a robust, steady funding stream. Proceeding without this funding involves either the assumption of greater risk in the readiness of the Army to meet current requirements, or the costly delay in the Transformation to a more responsive and dominant Army of the future.

**Within confined resources, the Army is doing well in undertaking a path of revolutionary change. Continued support and additional funding will be required to preserve the momentum of Transformation while simultaneously preserving the Army's capability to fulfill its enduring responsibility and commitment to the Nation.**



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# ARMY MODERNIZATION PLAN 2001

## ANNEXES

### Introduction

The main body of this *Army Modernization Plan* discusses how the Army will transform itself over time into the Objective Force. This plan is focused on implementation of Army Transformation, the purpose of which is to preserve the Army's ability to execute the National Military Strategy and preserve its enduring full spectrum dominance in the evolving strategic and operational environment. That strategy requires the capability to fight and win Major Theater Wars (MTWs) at the same time we support peacetime engagement and remain ready to execute all missions assigned. The evolutionary development of today's Army into light and heavy forces has left a capability gap in the mid-intensity area of the spectrum of operations. That is the area where success requires both responsiveness, achieved by rapid deployment and arriving ready to fight, and a high level of military capability in the form of lethality, tactical mobility, and survivability.

Two of the Transformation paths or vectors (Legacy Force and Interim Force) address maintaining our supremacy in fighting and winning MTWs and fielding an element of the force that can address the capability gap. Selective modernization and recapitalization of the existing forces, referred to as the Legacy Force, will maintain and improve as necessary our

war-winning edge over any potential opponents. At the same time, we are fielding a complementary set of units (initially the Interim Brigade Combat Teams (IBCTs) and eventually the Interim Division) that fills the gap between the exceptional responsiveness of our light and special purpose forces and the dominant lethality and survivability of our heavy forces. The end state, however, remains the future Objective Force.

The long-term need is for a force that is truly multi-role and fully capable of dominating any adversary in any environment. The Objective Force embodies the characteristics required for dominant superiority across the spectrum of conflict—responsiveness, deployability; lethality, survivability, agility, versatility, and sustainability. The IBCTs are only part of the solution. They are more responsive than today's heavy force and more lethal, survivable, and tactically mobile than today's light force, but until we can field the Objective Force we must maintain all of the capabilities embodied in our light, interim, and heavy forces.

Once fielded, the Objective Force will provide the National Command Authorities with an Army of units that embody the best characteristics of the heavy and the light forces, units that are truly multipurpose, combined-arms, and full spectrum. They will be enabled by a system of systems that inherently contains all of the

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capabilities found in the disparate pieces of today's Army, yet requires far less logistical support to function at high efficiency. This future force, like the Army of today, will be designed to operate as part of a joint team of forces from all Services. *Joint Vision 2020* (JV 2020), published in June 2000, which serves as the guiding framework for how the joint forces, including the Army's Objective Force, will operate in the future strategic and operational environment.

### **Joint Vision 2020: Conceptual Framework for Full Spectrum Dominance**

JV 2020 guides the continuing transformation of America's Armed Forces in the 21<sup>st</sup> century. The overall goal of Army Transformation is the creation of a force that is dominant across the full spectrum of military operations—persuasive in peace, decisive in war, preeminent in any form of conflict. JV 2020 describes the operational concepts necessary to shape our joint forces to meet the Nation's strategic goals.

The overarching focus of JV 2020 is Full Spectrum Dominance achieved through the interdependent application of Dominant Maneuver, Precision Engagement, Focused Logistics, and Full Dimensional Protection. Attaining that goal requires the steady infusion of new technology and modernization and replacement of equipment. Materiel superiority alone, however, is not sufficient. Of greater importance is the development of doctrine, organizations, training and education, leaders, and

people that effectively take advantage of the technology.

The evolution of these elements over the next two decades will be strongly influenced by two factors. First, the continued development and proliferation of information technologies will substantially change the conduct of military operations. These changes in the information environment make information superiority a key enabler of the Transformation. Second, U.S. Armed Forces will continue to rely on a capacity for intellectual and technical innovation. The pace of technological change, especially as it fuels change in the strategic environment, will place a premium on our ability to foster innovation in our people and organizations across the entire range of joint operations.

JV 2020 lays out the concept for future joint warfare. It has five central functional imperatives that the joint force and its land power component must be able to do to execute the future fight. These imperatives, expressed as essential capabilities, are the following:

- **Dominant Maneuver**—the ability of joint forces to gain positional advantage with decisive speed and overwhelming operational tempo in the achievement of assigned military tasks.
- **Full Dimensional Protection**—the ability of the joint force to protect its personnel and other assets required to decisively execute assigned tasks.
- **Precision Engagement**—the ability of joint forces to locate,

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discern, and track objectives or targets; to select, organize and use the correct systems to engage or attack; and to generate desired effects, assess results, and reengage with decisive speed and overwhelming effect as required throughout the full range of military operations.

- **Focused Logistics**—provide the joint force the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity, across the full range of military operations.
- **Information Superiority**—the attainment of superior information flow that supports mission objectives.

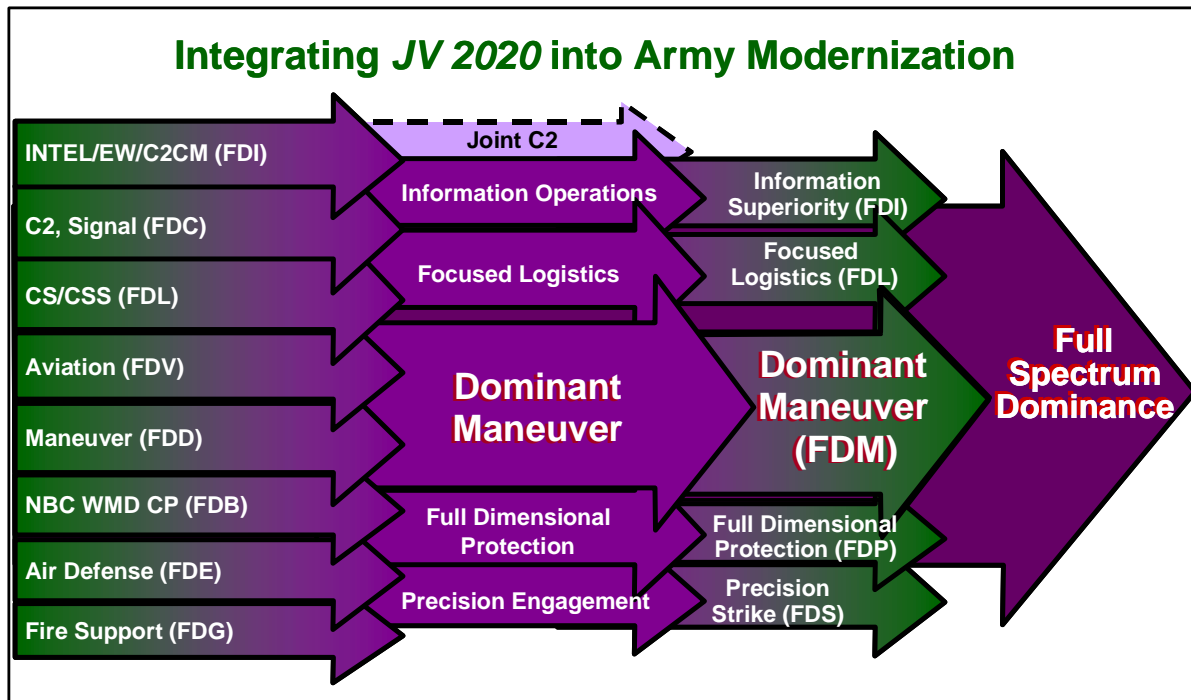
We must continue to invest in and develop new military capabilities where needed to make our Army faster, more lethal, and more precise in 2020 than it is today. The following annexes to the *2001 Army Modernization Plan* outline our major efforts to equip the force to achieve the operational capabilities of **Dominant Maneuver, Precision Engagement, Focused Logistics, and Full Dimensional Protection**. Additionally, the essential enabler of **Information Superiority** is addressed in a separate annex, as is **Space**, another key full spectrum functional area. Finally, the annex on **Force Structure** covers the integral components of manning and organizing forces necessary to implement the capabilities defined in *JV 2020*.

The operational concepts of *JV 2020* establish a framework for the Army to refine and focus its doctrinal, force,

and leader development efforts. While all these joint concepts are vitally important, for the Army, as a predominantly ground combat force, the concept of dominant maneuver is preeminent and is our focus. The remaining *JV 2020* operational concepts support the execution of dominant maneuver.

Although they will discuss some Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) organizations and equipment, the annexes will not focus specifically on digitization. Digitization has become a fact of the environment for the Army. The Legacy Force, along with the IBCTs, is already on the way to fielding digital systems and systems of systems. These will provide high-capacity, high-tempo C4ISR and logistics information flow to operations through computerization and digitization of key functions. They are central to increased effectiveness of the Counterattack Corps, and the Army will also put those same kinds of capabilities into the IBCTs and light organizations. Digitization will continue until the entire Army, both the Active Component (AC) and Reserve Component (RC), is digitized.

Modernizing or equipping the Army is supported by the program categories of **modernization, recapitalization (rebuild and selected upgrade), and maintenance**. All Army equipping programs fall within one of these categories, and the combination of efforts within these categories is carefully balanced to achieve revolutionary new capabilities for the



future, while preserving a dominant capability for the Army of today.

The Army's Investment Strategy is its means of using the totality of the equipping programs in the best and most efficient manner to achieve the Army of the future that fulfills the new strategic and operational requirements. The categories for this Investment Strategy relate directly to the forces that will make up the Army throughout the Transformation process—Objective Force, Interim Force, and Legacy Force. The linkage of equipping programs by category to the respective force they will support contributes to identifying the appropriate levels and priorities of investments by the Army throughout the Transformation.

## Structure of Annexes

There are seven annexes included with this year's *Army Modernization Plan*. The first four discuss the respective

operational concepts of *JV 2020* and how they relate to Transformation as well as how the Army's functional areas provide the requisite capabilities to support the concepts. A fifth annex addresses the essential enabler of Information Superiority, its relationship to Transformation and how the Army achieves this capability. A sixth annex covers the full spectrum functional area of Space, and how this area supports other capabilities, relates to Transformation, and is achieved by various programs. Finally, a seventh annex addresses key force structure initiatives that are essential contributors to all other concepts and enablers. Following is a summary of these seven annexes:

## Annex A: Dominant Maneuver

This operational concept refers to the ability of forces to gain positional advantage with decisive speed and overwhelming operational tempo in the

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achievement of assigned tasks. For the Army, this concept is a paramount focus, given the Army's responsibility as the Nation's primary land force. Army Transformation has the objective of maintaining and furthering the Army's position as the preeminent ground combat force in the world in the strategic environment and technological conditions anticipated in the future. This annex describes how the respective functional areas of Ground Combat Maneuver and Mobility and of Aviation contribute to the achievement of Dominant Maneuver as well as support overall Army Transformation through a combination of materiel programs. Specific key systems are briefly described for each functional area, and an assessment of their current state is offered.

## **Annex B: Full Dimensional Protection**

This operational concept refers to the ability of forces to protect personnel and other assets required to successfully execute all assigned missions. For the Army, achievement of Full Dimensional Protection will preserve the combat capability of the force and thus directly support the success of Transformation and its associated goal of full spectrum dominance. This annex describes how the respective functional areas of Air and Missile Defense; Nuclear, Biological, and Chemical protection; Engineer survivability; and Military Police support the achievement of Full Dimensional Protection of Army forces and successful Transformation of the Army. Specific key systems in these functional areas are highlighted and

described, and assessments are provided on their present states.

## **Annex C: Precision Engagement**

This operational concept refers to the ability of forces to locate, appropriately select, and effectively attack targets throughout the full range of military operations. For the Army, achievement of Precision Engagement is primarily through the use of ground-delivered fire support capabilities, with important contributions of selected air-delivered capabilities from Army Aviation forces (covered separately in Annex A as part of their contribution to Dominant Maneuver). Precision Engagement directly relates to the success of Transformation, since full spectrum dominance depends heavily on the ability to neutralize hostile threats in all operational environments. This annex describes how this functional area supports Army Transformation and provides the capabilities and effects (lethal, nonlethal, and electronic) required for effective Precision Engagement in the future. Specific key systems are described, and an overall assessment of progress is provided.

## **Annex D: Focused Logistics**

This operational concept refers to the provision of the necessary personnel, equipment, and supplies at the right place and time for the full range of military operations. The Army Transformation process depends heavily on success in the vital area of Focused Logistics, since this overall capability is indispensable in fielding a more rapidly responsive and



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sustainable force for all future contingencies. This annex describes how the modernization efforts in the Combat Service Support functional area will support Transformation and provide the necessary components for highly effective Focused Logistics in the future. Specific key systems are identified and briefly discussed, including selected general engineering systems, and an assessment of current progress is provided.

## **Annex E: Information Superiority**

This is an essential enabler to the achievement of the four primary operational concepts discussed in Annexes A through D. It refers to the attainment of superior information flow that supports mission objectives across the full range of military operations. Army Transformation is largely dependent on exploiting and incorporating information age technology in future systems. This annex describes how the modernization efforts in Command, Control, and Signal and Intelligence and Electronic Warfare functional areas will further the achievement of Information Superiority and likewise support Transformation objectives. Specific key systems are discussed and overall assessments of progress are provided.

## **Annex F: Space**

Space is an overarching area that applies, in military terms, to all operational concepts in *JV 2020* as well as to the essential enabler of Information Superiority. Space capabilities are spread over many

functional areas and are also pervasive in their support role in the successful Transformation of the Army into a dominant, full spectrum force. This annex describes the various modernization efforts to provide effective space capabilities that will contribute to all elements of the Army during Transformation—present and future—and will support the success of land component forces. Specific key systems are highlighted and described, and an overall assessment of Army Space efforts is provided.

## **Annex G: Force Structure**

While not a concept or enabler of *JV 2020*, the area of Army force structure is an integral part of the Army's ability to man and organize forces to fulfill the capabilities identified in *JV 2020* and to achieve the responsive, full spectrum dominance envisioned in Army Transformation. People are the centerpiece of Army Transformation, and force structure is the means of translating individual soldiers and civilians into effective organizations capable of accomplishing missions in a wide range of contingencies. This annex discusses the current and planned force structure initiatives that are designed to support Army Transformation.

## **Summary**

The Army is not about equipment. More than any other Service, the Army's capability is embodied in organizations made up of soldiers and leaders who employ equipment to accomplish mission-essential tasks. That is why Transformation is about units, the tasks those units must

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perform, and, finally, about the tools that they need to perform them. The Army Transformation strategy provides for the essential capabilities needed to execute all aspects of the National Military Strategy in the form of organizations focused on major tasks: rapid contingency response, small-scale contingencies, forcible entry, containment in early phases of MTW, and operational counteroffensive. The Transformation strategy ensures that adequate organizational capabilities are aligned with these major tasks. Each force element is equipped with the items that, when combined with good training and leadership, will assure success in its assigned tasks while we go about building a truly full-spectrum Objective Force. That force will be built on a foundation of functional organizations, each with a common suite of capabilities enabled by a system of multi-functional, networked platforms and C4ISR.

Unlike its predecessors, this *Army Modernization Plan* is not about cataloging the replacements for today's warfighting machines. Its aim is to explain how the Army will sustain existing adequate capabilities and acquire those needed to meet specific organizations' future warfighting needs. With the exception of the sections on Force Structure (Annex G) and Space (Annex F), the annexes of this plan follow the basic outline of the Transformation strategy. In the context of the various force elements described earlier, the annexes discuss the capabilities required and how the Army is meeting those needs through a combination of maintenance, recapitalization, selective upgrade of capabilities, and modernization to replace obsolete or non-existent capabilities. Although they necessarily discuss systems, the intent of each annex is to show how those systems give specific organizations the capabilities needed for assured accomplishment of their missions.

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## ANNEX A: DOMINANT MANEUVER

### General

**Dominant Maneuver** is the ability of joint forces to gain positional advantage with decisive speed and overwhelming operational tempo in the achievement of assigned military tasks. Widely dispersed joint air, land, sea, amphibious, special operations, and space forces, capable of scaling and massing force or forces and the effects of fires as required for either combat or noncombat operations, will secure advantage across the range of military operations through the application of information, deception, engagement, mobility, and countermobility capabilities.

Dominant Maneuver requires forces that are adept at conducting sustained and synchronized operations throughout the full spectrum of operations, in all environments, and with joint and combined forces to rapidly achieve objectives from dispersed locations, at reduced risk, and with fewer platforms and a smaller logistics requirement. Dominant Maneuver forces must take advantage of the enablers provided by Full Dimensional Protection, Precision Engagement, Focused Logistics, and Information Superiority to engage enemy forces with the least risk, highest combat overmatch advantage, and lowest use of scarce resources. However, the Army, as a ground combat force, must recognize that Dominant Maneuver is the preeminent operational concept and that the remaining concepts support achieving that end.

The Army must inject critical information technologies into the Legacy Force systems to sustain combat overmatch, take advantage of the Dominant Maneuver enablers, and gain critical experience and knowledge with emerging technologies to support the goal of a seamless transition to the Objective Force.

Dominant Maneuver capabilities are provided primarily by the Army's ground combat maneuver forces (infantry and armor units), by the mobility forces (Engineer units), and by the aviation forces (Army aviation units). To ensure the Army continues to sustain the capability to provide Dominant Maneuver forces to the joint force commander, the Army must plan and implement the modernization of these forces, recapitalize (rebuild and selected upgrades), and maintain legacy systems to sustain readiness while transforming the Army from the Legacy Force and Interim Force to the Objective Force.

Critical to the Transformation process is the synchronization of readiness, recapitalization, and Transformation while mitigating the risk to the Army's contract with America to win the Nation's wars and fulfill all missions assigned by the National Command Authorities (NCA).

We must adapt our leadership, training and education, doctrine, organizations, and materiel to achieve Full Spectrum Dominance. The Army will modernize through the development of the Objective Force, quickly field an Interim Force to provide strategic

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responsiveness and operational dominance across the full spectrum of operations and environments, and selectively upgrade, rebuild, and maintain critical legacy systems to ensure the Army is ready to fight and win, any place, at any time.

While the Army Modernization Plan focuses on the materiel solutions to achieve Dominant Maneuver throughout the full spectrum of operations, the materiel programs integrate people, leadership, doctrine, education and training and organizational structure to support the concept of joint Dominant Maneuver. The Army seeks to provide the joint force commander with Army systems embedded in units that can attack targets successfully, with fewer but more potent platforms, and with less ordnance, while achieving objectives more rapidly and with reduced risk. To outpace and outmaneuver any enemy, the Army must empower its warfighters through Information Superiority, Precision Engagement, Focused Logistics, Full Dimensional Protection, and Dominant Maneuver.

The Army's equipping programs are specifically organized by functional areas that relate to their battlefield missions. These functional areas serve as vehicles for specific program management and implementation throughout the Army. Each functional area brings a unique and essential capability to the Army. The combination and synergy of all

functional areas is what makes the Army an effective instrument in supporting the National Military Strategy (NMS) and *Joint Vision 2020* (JV 2020), in fulfilling its contractual obligation to fight and win the Nation's wars when needed and successfully fulfilling all missions assigned by the NCA.

This annex discusses the unique contributions that the Combat Maneuver and Mobility and the Aviation functional areas make to the Army's overall capability in support of Full Spectrum Dominance through Dominant Maneuver. Additionally, it describes how the strategy for equipping the Maneuver and Mobility functional area and the Aviation functional area fits into the overarching Army modernization and investment strategies that are designed to implement Transformation in the coming years.

Overall, the strategy for modernization of the Maneuver and Mobility and the Aviation functional areas aims fundamentally at supporting the Army's Transformation process within the existing resource constraints affecting the FY02 President's Budget (PB02) while providing dominant ground maneuver/combat overmatch in support of JV 2020. The final portion of this annex assesses the current state of modernization in supporting Transformation in light of these existing constraints.

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## Ground Combat Maneuver and Mobility Forces

### Overview

Ground combat maneuver and mobility systems provide dominant overmatch for decisive operations throughout the spectrum of conflict. They provide the Nation's ultimate guarantee for conventional, high-intensity combat through lethality, tactical mobility, and survivability while seizing and retaining objectives or exploiting success.

In the challenging and complex environment of the 21st century, the Army will continue to provide Dominant Maneuver land power for the Nation. Central to that land power are the ground combat maneuver and mobility forces. They provide the Nation the capability to physically place a dominant force on the ground to impose our national will throughout the full spectrum of operations. Maneuver, mobility and accompanying soldier systems are directly involved in all seven of the Army's missions: deploy, fight and win Major Theater Wars (MTWs), promote regional stability through presence, deter aggression and coercion through readiness, prepositioning and responsiveness, and conduct Small Scale Contingencies (SSCs) all as part of a joint force. As the Services assimilate new technologies, one constant remains—assuring attainment of strategic objectives requires the decisive projection of sustained maneuver and mobility forces—"boots on the ground" operating as part of a joint force.

### Combat Maneuver and Mobility Modernization in Support of Transformation

#### Overview

Like the rest of the Army, maneuver and mobility forces will transform to their Objective Force end state along three major paths—the Legacy Force, the Interim Force, and the Objective Force. The Army will maintain and improve warfighting capabilities of the Legacy Force through modernization, recapitalization, and digitization. The sustainment and improvement of legacy systems will focus on the Counterattack Corps to ensure combat overmatch and mitigate risk as the Army transforms to the Objective Force. Improving survivability, lethality, and maintainability are critical components of the strategy. To support Dominant Maneuver readiness for the joint force, the Army seeks to capitalize on the insertion of information-age technology through digitization, lethality capabilities through improved acquisition technology and advanced munitions, thus providing our highly trained soldiers with the tools necessary to



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fight as the dominant land component of the joint force anywhere at anytime.

During the Army's Transformation, we will sustain combat maneuver and mobility forces currently in the Legacy Force to guarantee near-term warfighting readiness. We will recapitalize selected mechanized maneuver and mobility forces to extend the service life of Legacy Force systems, reduce operating and support costs, and improve system reliability, maintainability, safety, and effectiveness. At the same time, we will continue to enhance heavy and light force lethality and survivability. Our legacy combat maneuver and mobility forces will maintain the capabilities we currently have and add others through technology insertions, as they become available, thus ensuring our ability to meet our nonnegotiable contract to fight and win the Nation's wars as we transform.

The upgrade of our legacy systems through the integration of digitization and Operations and Support (O&S) cost savers will enhance the Army's ability to achieve Dominant Maneuver. Expanded situational awareness, improved lethality at longer ranges, reduced logistical requirements, and improved survivability will allow the joint force commander to conduct sustained and synchronized operations from dispersed locations.

## **Systems**

**Light Forces.** Our modernization of light combat maneuver forces will ensure combat overmatch for the five types of Legacy Force infantry (air assault, airborne, light, mechanized

and Ranger) in the close, personal, and brutal fight. The fielding of Land Warrior, an Objective Force system, will significantly enhance the lethality, survivability, and tactical mobility of our dismounted infantry. Soldiers will have more situational awareness and precision target acquisition (day and night) and can fire while unexposed. Survivability is increased with a light, improved ballistic helmet and lighter, more protective body armor. Fratricide will be reduced because of improved situational awareness and the ability to tell friend from foe. The soldier load will be lighter, providing improved tactical mobility.

Acceleration of the Line-of-Sight Antitank weapon (LOSAT) along with the revalidation of the tube-launched, optically-tracked, wire-guided missile (TOW) fire-and-forget system, coupled with fielding of the Mortar Fire Control System (MFCS), will enhance legacy light force direct fire and indirect fire capabilities. The LOSAT consists of kinetic energy missiles (KEM) and a second generation Forward-Looking Infrared Radar (FLIR) (SGF) mounted on an air mobile modified, expanded-capacity High Mobility Multipurpose Wheeled Vehicle (HMMWV) chassis. The KEM defeats all predicted future armored vehicles, giving the LOSAT great potential as an Objective Force anti-armor weapon system. The TOW fire-and-forget system (which fires from legacy platforms), provides a long-range chemical energy munitions anti-armor capability. The fire-and-forget technology increases both the survivability and lethality of our legacy light forces. The MFCS will allow infantry mortars to send and receive digital calls for fire messages and

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possesses the ability for first-round fire for effect.

**Mechanized Forces.** Our modernization and recapitalization efforts for legacy mechanized forces give priority to maintaining near-term warfighting capability of a Counterattack Corps. Enhancements will include upgraded variants of fielded equipment, such as the M1A2 Abrams System Enhancement Program (SEP) tank, the M1A1 D, the M2A3 Bradley Fighting Vehicle (BFV), the M2A2 recapitalized Bradley, the Engineer Bradley Fighting Vehicle (ODS-E) and the Long Range Advanced Scout Surveillance System (LRAS3). The Abrams Integrated Management (AIM) and the Bradley recapitalization program extend the lives of both the Abrams M1A1 and Bradley fleet to meet warfighting requirements as the Army transforms to the Interim and Objective Forces. The rebuild of the M88A1 Recovery Vehicle for the Active Component (AC) and the Reserve Component (RC) is a critical life-extension program to ensure the heavy force is supported throughout Transformation. The Wolverine provides an assault bridge to enable heavy force mobility. The Grizzly, currently unfunded, provides an essential obstacle breaching capability that does not exist anywhere in the force.

**Interim Force.** Combat maneuver and mobility forces initiated Interim Force implementation in FY00 by beginning the conversion of two Fort Lewis-stationed units—a 2nd Infantry Division heavy brigade and a 25<sup>th</sup> Infantry Division light brigade—to an initial configuration. Each of these

brigades will be provided with commercial off-the-shelf (COTS) items, surrogate vehicles, digitized communications, and equipment currently available in the Army inventory. These initial brigades will accomplish two goals. First, they will give combat maneuver and mobility forces an enhanced capability for operational deployment to meet worldwide requirements. Second, they will validate an organizational and operational model for transformation of combat maneuver and mobility forces to interim and Objective Force configuration. The FY02-07 Plan fields and sustains six IBCTs, including a RC brigade. The first IBCT will be operational in 2003 and the second IBCT will be operational by 2004. The first two IBCTs at Fort Lewis will not be experimental formations; they will be fully combat-capable and the vanguard of the future Objective Force.

The Interim Armored Vehicle (IAV), based on the Light Assault Vehicle (LAV III), will be the centerpiece combat and combat support platform for the IBCTs of the Interim Force. It will fulfill an immediate requirement for a strategically deployable (C-17/C-5) and operationally deployable (C-130) brigade capable of rapid movement anywhere on the globe in a combat-ready configuration. We will field two variants of the IAV: the Mobile Gun System (MGS) and the Infantry Carrier Vehicle (ICV). The family of IAVs is centered on the ICVs. There will be eight additional configurations of the ICV: Reconnaissance Vehicle, Mortar Carrier, Commander Vehicle, Fire Support Vehicle, Engineer Squad Vehicle, Medical Evacuation Vehicle, Antitank Guided Missile Vehicle, and

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Nuclear, Biological, and Chemical (NBC) reconnaissance vehicles.

**Objective Force.** The critical path of Transformation leads to the Objective Force. Today, the science and technology (S&T) community is working hard to develop answers to questions we have asked: How do we reduce the armored volume in combat vehicles while increasing survivability? How do we increase deployability without sacrificing survivability and lethality? The culminating phase of this S&T for combat maneuver and mobility forces will be the achievement of Objective Force capabilities in the Future Combat Systems (FCS). The FCS is envisioned as a digitized, system of systems, land-combat capability with multimission functionality. FCS's primary design characteristics include networked command and control (C2) on the move; beyond line-of-sight (BLOS) direct fires; advanced, long-range, precision indirect fires; standoff sensors; countermine capability; and robotics. When technologies are mature, and when the production lines are ready, we will field the FCS in unit sets.

The S&T development of a common missile that may be employed on a variety of platforms, both ground and air, will reap significant benefits in operational flexibility for the warfighter through a common caliber solution that will profoundly reduce the logistics footprint of deployed forces. The development and production of the common missile will yield a reduction in life-cycle costs over separate and distinct systems currently fulfilling ground and air missile requirements.

**Soldier Systems.** The S&T development of the objective family of small arms is a complementary effort leading to improving the lethality of dismounted soldiers in combat maneuver formations of the Objective Force. The Objective Individual Combat Weapon (OICW) is the next generation, individual weapon system for U.S. Armed Services. This modular, dual-barrel weapon system includes revolutionary 20mm air-bursting munitions; standard NATO 5.56mm kinetic energy projectiles; and integrated fire control. The system will provide decisively violent and suppressive target effects out to a range of 1,000 meters—a significant increase in the lethality of the dismounted soldier. A replacement for selected M16 rifles, M4 carbines, and M203 grenade launchers, the OICW provides the lethality block upgrade for the Land Warrior.

**Seamless Transition.** The maintenance of a trained and ready force to ensure operational readiness and technology transfers from the upgraded legacy systems and interim systems to the Objective Force is the focus of the modernization effort. Certain technologies developed first in legacy systems, as part of modernization programs, will ultimately lead to Objective Force platform technology insertions. The SGF drive-by wire technology and a remotely operated weapons platform in the Grizzly, Force XXI Battle Command, Brigade and Below (FBCB2) integration, power plant improvements, munitions development, digital components and integrated communications systems (voice activation, wireless intercoms), and the

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STAMIDS family of standoff minefield detection systems provide the material transition to the Objective Force. The experiences our soldiers and commanders will have with these emerging technologies will lead to a nearly seamless transformation to the maneuver and mobility forces of the Objective Force.

## **Discussion of Equipment**

### **M1A2 Abrams System Enhancement Program (SEP)**



**Description.** The M1A2 SEP is an upgrade of the fielded M1A2 tank. M1A2 SEP upgrades enhance the target acquisition system and computer electronics. SEP upgrades seek to reduce the signature through thermal management, bridge the gap between the precision engagement systems and Dominant Maneuver by enhancing long-range acquisition using advanced FLIR technology and improved battlespace awareness through digitization. Mission processing units in the turret and hull are the heart of the core electronic systems. These complementary, redundant units manage the data/utility bus for all subsystems within the tank. The tank's computer architecture was revised to be compatible in the common

operating environment. The inclusion of the following systems: a Global Positioning System (GPS) receiver coupled with existing Position/Navigation (POSNAV) system, Integrated Combat Command and Control (IC3) hosting FCB2 software; SGF combines to improve the lethality of the system along with digital C2 and situational awareness for the commander. SGF components of the fire control system provide increased capability in target acquisition and engagements through improved, high-resolution thermal images ranging in power from 3X to 50X. The Commander's Display Unit (CDU) possesses dual displays: a color display for digital maps and graphic control measures for IC3, and a display for the SGF thermal images from the Commander's Independent Thermal Viewer (CITV). A Thermal Management System (TMS) is added to provide cooling to the turret computer components to reduce heat and increase reliability, with a secondary purpose to increase crew endurance in hot climates. The production of M1A2 SEP will include integration of the new Abrams Crusader common engine. This new engine will dramatically reduce O&S costs. The M1A2 SEP induction platform is the M1 and the M1A2. Using these induction platforms significantly reduces the unit cost.

**Operational Requirement.** The requirement is to close with and destroy enemy ground forces using Survivability—capable of surviving against the full range of battlefield threats; Lethality—capable of destroying any known threat on the modern battlefield; Mobility—key



components include speed, acceleration, and maneuverability; Information Dominance—key components are situational awareness and digital C2. Critical to maintaining combat overmatch is the development of munitions that take advantage of the increased target acquisition capability of the M1A2 SEP.

**Program Status.** Procurement of the M1A2 SEP for fielding to the Counterattack Corps began in FY00 with the First Unit Equipped (FUE) in July 2000. The total procurement of 1,174 M1A2 SEPs will provide sufficient capability for the Counterattack Corps. The procurement and fielding will continue through FY12. The Army is taking risk by not fielding M1A2 SEP to Army prepositioned stocks or to other AC units.

### **M1A1 Abrams Integrated Management (AIM)**



**Description.** The AIM overhaul concept is the most cost-effective solution to address the problems of rising tank sustainment costs and increasing readiness concerns. The AIM process overhauls an old M1A1 tank to original factory standards and applies all applicable Modification Work Orders (MWOs). The AIM process uses a partnership among Program Manager (PM)-Abrams, the Army Materiel Command (AMC), and

General Dynamics. The hulls and turrets are dismantled at Anniston Army Depot (ANAD). The hulls are overhauled at ANAD and the turrets are stripped, prepared, and shipped to Lima Army Tank Plant (LATP) for overhaul and final assembly. Once the hulls are completely overhauled, they are shipped to LATP where hulls are married up with a turret for final assembly. The AIM overhaul program is the optimum time/location to complete applied improvements. The



current engine, AGT 1500, was last built in 1982 and is the current engine for the AIM tank. Over 12,000 AGT 1500 engines were built using 1960s technology. The AGT 1500 accounts for over 64% of the O&S costs. The production of the new Abrams Crusader Common Engine will significantly decrease O&S costs (from \$40,000 to \$6,000 per tank, per year) when it is integrated into the AIM rebuild and upgrade line.

**Operational Requirement.** The readiness of the aging tank fleet must be improved, combat overmatch must be maintained, and O&S costs must be reduced. Eighty-three percent of the tank fleet requires recapitalization. Presently, the tank ranks second highest in Army O&S costs. In fact, the Abrams accounts for one-half the repair cost of the entire ground combat fleet.

**Program Status.** The procurement and fielding of the M1A1 AIM tank is



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critical for O&S cost reduction as well as overall fleet age. At 135 per year, the fielding to units will continue through FY11. While current procurement and fielding plans do not allow the fleet to meet fleet age requirements, it will significantly reduce costs. Critical components include the Abrams Crusader Common Engine integration, survivability packages, and other critical modifications. Side armor protection and SGF integration is underfunded and places M1A1 AIM tanks at risk against project threat formations. The FUE was in the 4th Infantry Division and was digitized at the same time. Engine production from FY04 through FY13 provides 2,005 engines. Approximately 988 M1A1 AIM and M1A2 SEP tanks will be fielded without the new engine and will require retrofit unless this program is accelerated. Retrofit will require returning the Abrams tank to the AIM line for installation. While all M1A2 SEP tanks will eventually have a new engine only half of the M1A1 D tanks will have the new engine unless additional funding is provided. The Army National Guard (ARNG) will receive AIM tanks cascaded from the AC and, where funds are available, receive rebuilt tanks directly from the AIM program.

### **M1A1 D (Digitized)**

**Description.** The M1A1 D is a digitized M1A1 that provides improved C2 and situational awareness using an applied computer and Far Target Locate (FTL) capability. The applied computer utilizes FCB2 software. The FTL capability is the key enabler in making an M1A1 D. FTL consists of a North Finding Module (NFM), a Digital

Interface Unit (DIU) and an Eye Safe Laser Range Finder (ESLRF). FTL allows the crew to digitally report the location of enemy targets to +/- 10 meters. FTL is also the means by which situational awareness is initially inputted into the FCB2 system. The M1A1 D is interoperable in the common operating environment and supports both the FY00 4th Digital Division and FY04 III Corps requirements.



**Operational Requirement.** The requirement is to close with and destroy enemy ground forces using Survivability—capable of surviving against the full range of battlefield threats; Lethality—capable of destroying any known threat on the modern battlefield; Mobility—key components include speed, acceleration, and maneuverability; and Information Dominance—key components include situational awareness and digital C2I.

**Program Status.** The procurement and fielding of the M1A1 D kits continues through FY10. The FUE was 1st Battalion, 66<sup>th</sup> Armored, 4th Infantry Division in October 2000. The M1A1 D is part of the III Corps and will be

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fielded to both the 4th Infantry Division and 3rd Armored Cavalry Regiment to meet that goal. Additional funding is required to field digitization kits to Abrams tanks in Army prepositioned stocks and to ARNG units. Fully funding the new engine will improve the capability of the M1A1 D and reduce O&S costs.

### **M2A3 Bradley Fighting Vehicle System (BFVS)**



**Description.** The A3 Bradley Fighting Vehicle (BFV) emerged as a result of a threat and capabilities assessment, designed to ensure that the mechanized infantry can overmatch the threat on the future Force XXI battlefield. The M2A3 is the first Infantry Fighting Vehicle (IFV) that is technologically equal to the Abrams tank. It completes correction of all Desert Storm deficiencies, capitalizes on ten years of mechanized infantry experience, and integrates Army Horizontal Technical Integration (HTI) initiatives (e.g., SGF).

The A3 insures overmatch by increasing the ability to acquire, identify, and engage over the A2, in both day and night conditions. The A3 Bradley allows the crew to acquire

more targets faster by adding another second generation thermal sight for the commander. The Improved Bradley Acquisition System allows the crew to engage targets faster and more accurately by enabling first burst on target, eliminating the need for a sensing round. The Position/Navigation (POS/NAV) system enhances the crew's navigation capability and their ability to pinpoint and identify friendly and enemy positions. The A3's new integrated digitized C2 system provides for a near-real-time integrated data link between the A3 Bradley and other combat vehicles. The C2 system is integrated with the vehicle fire control and POS/NAV system, providing the crew with the ability to identify and hand off targets to other BFVS, tanks, helicopters, artillery, and mortars. The A3 Bradley will facilitate enhanced C2, provide greater lethality, survivability, mobility, and sustainability required to defeat current and future threat forces. Most importantly, the Bradley A3 also enables operational compatibility with the Abrams M1A2 System Enhancement Program (SEP) main battle tank.

**Bradley Recapitalization Description.** The Bradley family of vehicles includes the M2A0, M2A2, M2A2 ODS, M2A2 ODS-D, M2A3, and the M2A2(R). These platforms will serve as the mechanized infantry platform for the legacy containment and counteroffensive forces. However, electronic obsolescence, lethality, and survivability issues must be resolved for the Bradley to maintain dominant overmatch through 2020. Until the technology to replace the M2 fleet with the FCS is developed, selective

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upgrades must be applied to the Bradley to achieve a decisive edge over emerging threat capabilities. Therefore, the U. S. Army Infantry Center (USAIC) and PM-Bradley have developed a Bradley recapitalization plan that includes limited upgrades for maintaining overmatch and for reducing operating and sustainment cost during Transformation to the Objective Force. This recapitalization plan meets mandated Department of Defense (DoD) guidance to achieve a Bradley system half-life metric for zero-age/zero-mile vehicles, and integrates selected system upgrades into the M2A3 Bradley that are necessary to meet A3 Operational Requirements Document (ORD) requirements and to reduce O&S costs. The Bradley recapitalization program ensures Bradley IFV viability throughout Transformation. The resultant composition of the force will be M2A3s in the Counterattack Corps, M2A2(R)s in the forward-deployed force and enhanced Separate Brigades (eSBs), and cascaded Operation Desert Storm (ODS) Bradleys in the ARNG divisions. Final determination of the force will be dependent on FCS fieldings.

**M2A2(R) Description.** The Bradley recapitalization program will zero-age/zero-mile 1,936 M2A2 Bradleys. At the end of this recapitalization process, each A2 Bradley will be transformed into an M2A2(R). The advantage of the A2(R) approach is that the DoD half-life metric is achieved, along with the proliferation of a common platform throughout the Bradley fleet. The A2(R) will realize significant reductions in fleet O&S costs. In addition, the A2(R) architecture takes advantage of current

technology and provides flexibility for future technology insertions.

**M2A2 ODS-D Description.** The ODS-D increases system lethality over the M2A2 by adding FBCB2 C2 capability. FBCB2 provides for a near-real-time integrated data link between the M2A2 ODS and other combat vehicles. The FBCB2 C2 capability will be integrated with the ODS's laser rangefinder, providing the crew with the ability to identify and hand off targets to other BFVs, tanks, helicopters, artillery, and mortars. In addition to FBCB2, the ODS possesses a PGS/POSNAV system that enhances the ODS's ability to maneuver with the rest of the combined arms team. The integration of GPS with the laser rangefinder allows rapid, accurate calls for fire via FBCB2. The addition of bench seats in the ODS Hull allows squad members the ability to dismount and remount faster. Crew survivability is also enhanced with the capability to integrate the Battlefield Combat Identification System (BCIS) and the missile countermeasure device. As M2A3 and M2A2(R)s are fielded to the AC and eSB units, ODS-Ds will be cascaded to ARNG divisions.

**Operational Requirement.** The BFV provides mobile, protected transport of an infantry squad to critical points on the battlefield and performs cavalry scout and other claimant (Bradley-equipped combat engineer, fire support and Stinger teams) missions.

**Program Status.** Between FY98 and FY08, the Army will complete the modification of 1,042 A2 Bradleys to the A3 Bradley while other Bradley recapitalization is unfunded. The

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Bradley recapitalization effort must be fully funded to maintain combat overmatch, minimize electronic obsolescence, and provide unprocurable spares for the remaining legacy Bradley fleet. Moreover, a fully funded Bradley recapitalization effort is required for the Bradley fleet to achieve its half-life (10 years) by FY10. Not counting the A0 Bradleys, the oldest Bradleys in the fleet, the Bradley fleet will have an average fleet age of 14.2 in FY10 unless the Bradley recapitalization program is fully funded.

### **Grizzly**



**Description.** The Grizzly is used to conduct in-stride simple and complex obstacle breaches. This platform is an M1 Abrams chassis-mounted system (mobility/survivability to match the maneuver force) with full-width (V-shaped) Mine Clearing Blade (MCB) with automatic depth control and power driven arm for obstacle reduction and digging. The commander's control station has a communications package, enhanced vision devices, and weapons (a remote-fired, 50-caliber machine gun and grenade launched screening smoke for self-defense). The system is manned by a two-person crew and is capable of breaching a 600-meter complex obstacle in 21 minutes and an antitank ditch in five

minutes. The platform can clear urban rubble and mines buried 12" to 15" deep.

**Operational Requirement.** The Grizzly incorporates both countermine and counter-obstacle capabilities into a single, survivable system that, in a single pass, creates a full width assault lane trafficable by the entire maneuver force. No alternative solution exists to meet this capability and, without Grizzly, the force depends upon outdated World War II technology used by dismounted soldiers, the sometimes unreliable Mine Clearing Line Charge (MICLIC), and the Armored Combat Earthmover (ACE). The inability to achieve overmatch in breaching capability will cause the operating tempo of the maneuver force to significantly decrease, which reduces task force survivability and limits the commander's maneuver flexibility.

**Program Status.** Program Budget Decision 745 released on 27 December 1999 removed all funding in FY01 and beyond for fiscal reasons caused by Army Transformation. Two prototypes are pending delivery. The contract expires on 31 August 2001.

### **Wolverine Heavy Assault Bridge (HAB)**

**Description.** The Wolverine is an MLC 70 assault bridge for heavy forces, providing combat gap crossing capability for the battalion task force. The bridge, carried on an M1A2 SEP chassis, is as mobile and survivable as the maneuver force, spans gaps up to 24 meters, launches in less than 5 minutes, and retrieves in less than 10 minutes. The platform is equipped with



FBCB2 digitization via appliqué and is manned by a two-man crew. The system is a one-for-one replacement for the Armored Vehicle Launched Bridge (AVLB), which has an average fleet age of 24 years, reduced gap crossing capability of fifteen meters for MLC 70 traffic, cannot keep pace with the M1/2 based force and relies on low-density repair parts and maintenance systems not common to the supported maneuver force.

**Operational Requirements.** The Wolverine provides heavy forces with a



military load class 70 assault crossing capability of gaps up to 24 meters with similar system mobility, survivability, sustainability, and logistics supportability as the supported force.

**Program Status.** Program Decision Memorandum 745 released on 27 December 1999 removed all FY01 and out-funding for this program. Funding was restored through FY02 for 44 LRIP vehicles. FUE occurred in February 2001. Failure to buy Wolverine will require retention of old M48/M60 based AVLBs with an average fleet age of 24 years. Currently, the program is unfunded for echelons above division units in the Counterattack Corps.

### **M113 Family of Vehicles**



**Description.** The M113 family of vehicles (FOV) consists of over 70,500 vehicles, has 20 different variants, and platforms, and is in service in Army units. The M113 FOV is on nearly half of the tracked vehicle fleet in a mechanized infantry or armored heavy division including the M113A2/A3, M577A2/A3, M981A2/A3, M1064A2/A3, and M1068A2/A3. The family provides transport for troops, antitank, fire direction, smoke, mortar, cargo carrier, and C2 systems.

**Operational Requirement.** The fleet is required for the next 20-plus years and must be modified to increase mobility and survivability, and to install operational enhancements. Operation Desert Storm highlighted the need to improve the mobility, survivability, chemical protection, driver's night vision, fuel system, and command post auxiliary power units (APUs) for the fleet.

### **Airborne Standoff Minefield Detection System (ASTAMIDS)**

**Description.** ASTAMIDS detects recently buried and surface antitank mines (including Field Artillery Scatterable Mines (FASCAM)). ASTAMIDS provides real-time



feedback on critical minefield locations to the brigade task force commander. The Night Vision Lab (NVL) utilizing the advanced electro-optic/infrared (EO/IR) sensor is developing an interim system. The SASO system detects buried, weathered in antitank mines and collects data to be postprocessed by software and soldiers.

### Operational Requirement.



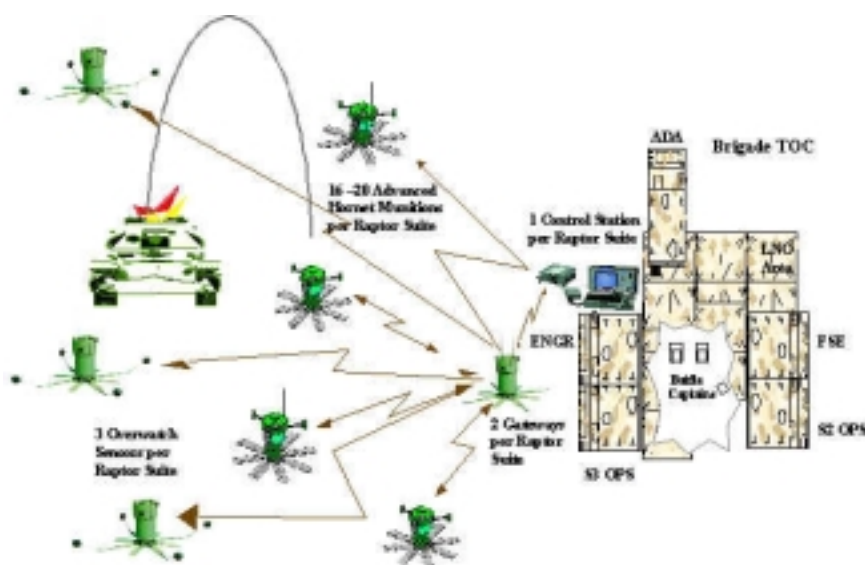
ASTAMIDS provides an airborne capability to detect antitank mines. The tactical ASTAMIDS will fly on an airborne platform and support the brigade task force commander. The Stability and Support Operations (SASO) ASTAMIDS will fly on a UH-60 and support the Military Operations Other Than War (MOOTW) commander. An interim tactical ASTAMIDS capability is being developed using existing sensor technology.

### Program Status.

ASTAMIDS is in concept exploration. Contract award is expected in FY03 and FUE in FY09.

### Raptor, Intelligent Combat Outpost

**Description.** Raptor is a tactical obstacle consisting of a Ground Control Station (GCS), advanced Hornet munitions, one or more gateways (artificial intelligence), Advanced Overwatch Sensors (AOS), and long-haul communications. Core Raptor obstacles will be hand-emplaced at ranges 35-50 km forward of the maneuver brigade Tactical Operations Center (TOC), and will detect, classify, and autonomously engage threat heavy and light tracked and heavy-wheeled vehicles based upon programmed attack tactics. Follow-on Raptor variants will incorporate longer-range communications and deep delivery capabilities to support Raptor employment 300km forward of the controlling TOC; identify-friend-or-foe capability to distinguish between threat and friendly vehicles; and advanced integration with artillery, aviation, and intelligence systems to provide real-time threat data to these systems; and will cue friendly fires to attack threat targets deep.

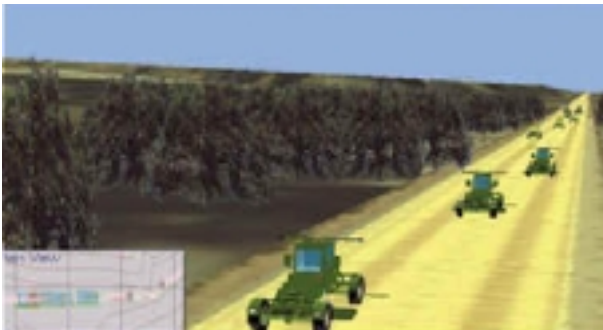


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**Operational Requirement.** Raptor is a suite of lethal or nonlethal munitions, sensors, communications, and software that work in consonance to enable the commander to protect his battlespace and influence the actions of his adversaries. Raptor will be used to detect, track, classify, and report the approach of enemy vehicles and aircraft, then arm munitions to attack, delay, disrupt, or destroy the enemy's movement.

**Program Status.** The Raptor ORD is being finalized and will be submitted to Training and Doctrine Command (TRADOC) for approval in 2001.

**Ground Standoff Minefield Detection System (GSTAMIDS)**



**Description.** GSTAMIDS Block 0 clears a 20km route in 12 hours using a tele-operated detection vehicle, Mine Protected Clearance Vehicle (MPCV), and a towing vehicle with proofing trailers. GSTAMIDS Block 1 clears a 40km route in six hours. The detection vehicle utilizes a multisensor, mine-detection suite consisting of metal detection, Ground Penetrating Radar (GPR), and IR to find all mines. The MPCV provides soldiers a blast-protected vehicle from which to remotely operate the lead-detection

vehicle and mine-detection subsystems. The MPCV supports mine confirmation and neutralization subsystems. GSTAMIDS Block 0 is a contingency-based item; a total of 10 systems will be fielded to contingency stocks from FY03-FY04. GSTAMIDS Block 1 will be fielded to corps engineer battalions (12 systems per corps engineer battalion).

**Operational Requirement.** The mission of GSTAMIDS Block 0 and Block 1 is to conduct route-clearance operations, eliminating all antitank mines. GSTAMIDS Block 2 will provide a forward-looking capability for mine avoidance. GSTAMIDS is a spiral development effort to provide an incremental, near-term capability to execute on-road countermine missions.

**Program Status.** GSTAMIDS Block 0 is in year two of a three-year Engineering and Manufacturing Development (EMD) phase. GSTAMIDS Block 0 begins government testing in September 2001. GSTAMIDS Block 0 begins production in FY02. GSTAMIDS Block 1 begins production in FY05.

**Hornet Wide Area Munition (WAM)**

**Description.** Hornet autonomously detects threat vehicles at distances up to 600m, then classifies and engages targets at ranges up to 100 meters. Hornet is a top attack munition, and launches sublet containing an IR sensor and an explosively formed penetrator warhead over the top of the target, firing at the target vehicle from above, resulting in a mobility or firepower kill. Hornet munitions may be employed in a series of randomly

spaced, off-route clusters to ambush enemy convoys (gauntlet pattern), to disrupt enemy formations (area disruption pattern), to reinforce bottom attack mines against breachers (overwatch pattern), or to engage high-value targets or deny key terrain in the enemy's rear area (deep interdiction).



**Operational Requirement.** The need exists for a smart munition that can autonomously search, detect, classify, engage, and destroy enemy tracked, armed, and heavy-wheeled vehicles at standoff distances up to at least 100 meters. Target vehicles include tanks, enemy breachers, light armored vehicles, reconnaissance vehicles, tank transporters, target erector launchers, and target erector launcher radars.

**Program Status.** Basic Hornet is in production. Materiel release is pending. Advanced Hornet and its control station are in EMD. Advanced Hornet procurement will begin in FY04.

### **Handheld Standoff Mine Detection System (HSTAMIDS)**

**Description.** HSTAMIDS is a handheld mine detector capable of detecting all metallic and nonmetallic antitank and antipersonnel mines. This system combines the maturing technology of GPR and improved metal detection to provide a high probability of detection for both large and small

metallic and nonmetallic antitank and anti-personnel mines. HSTAMIDS will significantly improve detection of the smaller, low-metal antipersonnel mines with a probability of detection for all mine types in excess of 95%. HSTAMIDS will reduce the percentage of false detections associated with operating in combat zones, by allowing the operator to “tune-out” the metallic clutter that affects the Army’s legacy mine detector, the AN/PSS-12. The (IR forward-looking detection subsystem component of HSTAMIDS has been deferred to a future product improvement effort. The overall design weight of the HSTAMIDS will be comparable to that of the AN/PSS-12 for both detector head weight and control equipment.



**Operational Requirement.** HSTAMIDS is a handheld mine detector capable of detecting all metallic and nonmetallic antitank and antipersonnel mines. HSTAMIDS will be a significant improvement over the current capability for detection of the smaller low-metal mines.

**Program Status.** HSTAMIDS successfully completed Prototype Definition and Risk Reduction (PDRR) and entered EMD in November 2000. HSTAMIDS will begin operational

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testing in FY03 and production in FY04.

### **Mongoose, Explosive Standoff Minefield Clearer (ESMC)**

#### **Description.**

Mongoose is an explosive countermine system that creates a vehicular lane by explosively neutralizing all surface and buried antitank mines from a position outside the lethal blast radius of the mines. Mongoose consists of a rocket-propelled explosive neutralization system (ENS) with shaped charge munitions embedded in a scalable, oblong net. The system is deployed and detonated from inside the towing vehicle without exposing the crew to direct or indirect fires. Mongoose is capable of neutralizing antitank mines with up to eight inches of overburden. Mongoose neutralizes mines by attacking the explosive component of the mine, not the fusing mechanism. Modeling shows the Mongoose neutralizes 95% of the antitank mines that fall beneath the explosive array. Mongoose will support both the medium force and heavy force with nets sized (length x width) and tailored to counter likely enemy threats. The smaller, lighter medium force variant will be towed by the Engineer squad's IAV. The mechanized force version of the Mongoose will be towed by either the Engineer squad M113 or another armored Task Force vehicle.

**Operational Requirement.** Mongoose provides an explosive clearing capability to the IBCT and Legacy



Force units, and is capable of neutralizing all mines regardless of fuze type. Mongoose uses shaped charge munitions spaced on a net to attack the explosive fill of antitank mines instead of relying on blast overpressure to defeat mines. Mongoose is designed in two sizes, a heavy and light version optimized for Interim and Legacy Forces.

**Program Status.** The program was approved to enter EMD in 2QFY98. The ORD was revised to develop an explosive countermine system to support the unique requirements of the IBCT. The ORD was approved in October 2000. FUE is FY06.

### **Common Bridge Transporter (CBT)**



**Description.** The CBT is a HEMMT chassis with a load-handling system installed (similar to the Palletized Load System (PLS)). It is capable of hauling the Improved Ribbon Bridge (IRB), Standard Ribbon Bridge (SRB), Bridge Erection Boat (BEB), Bailey Bridge, Medium Girder Bridge (MGB), and the Heavy Dry Support Bridge (HDSB). The adapter interface between the truck and components are the Bridge Adapter Pallet (BAP) for bays, the Improved Boat Cradle (IBC) for boats, and PLS flatracks for fixed bridging. The CBT is capable of transporting a



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10-ton load and hauling a loaded (10-ton) PLS trailer. It can upload or download palletized loads in one minute.

**Operational Requirement.** The CBT, along with the PLS trailer, is the prime mover for all future bridging systems with 56 of these systems assigned to each multi-role bridge company. This allows for the palletized movement of all bridging assets and the rapid installation of bridges in difficult terrain, as well as the movement of massive quantities of general cargo when bridging assets are not required.

**Program Status.** Fielding started in 1998 and is adequately funded in the PB02.

### **Improved Ribbon Bridge (IRB)**

**Description.** The IRB will replace the old SRB found in Engineer assault float bridge companies. The improved IRB bays are modified ribbon bays possessing better hydrodynamics and floatation capability and providing the capability of rafting or bridging MLC 70T traffic in currents up to 8 fps. It also has stronger ramp sections that support access/egress across higher riverbanks.



**Operational Requirement.** The IRB is an improvement over the SRB and provides a greater degree of flotation,

allowing crossings in faster currents as well as increased survivability against small arms fire and small artillery fragments. The bays can be connected in one minute and can also be connected to the SRB. The ramp bays can be hydraulically articulated to two meters. The IRB will be employed in the same general manner as the SRB. However, it will be able to cross faster water with higher MLCs and with banks that are up to two meters high.

**Program Status.** The program is adequately funded in the PB02.

### **Bridge Erection Boat (BEB)**



**Description.** The new BEB is being procured to replace the old worn-out BEBs in our current inventory. We are also making modest improvements to the old design to permit the safe and efficient handling of the new ribbon bridge components in fast water. The BEB will be transportable on the CBT.

**Operational Requirement.** The BEB has two primary uses: to connect bays and fabricate the ribbon bridge system, and to propel rafts made from ribbon bridge bays as they ferry vehicles before a ribbon bridge is completed. Heavy rafts are often the initial crossing means for tanks and other fighting vehicles because they are faster to assemble than bridges and can operate from multiple sites to



reduce their vulnerability. The boat will be operated and maintained in all geographical areas where flowing streams or rivers may become obstacles to the tactical mobility of U.S. and NATO ground forces.

**Program Status.** The program is adequately funded in the PB02.

### **Digital Topographic Support System (DTSS)**

**Description.** The DTSS integrates COTS hardware and laboratory-developed software package to provide terrain information to the warfighter. These capabilities are being provided in four distinct configurations: DTSS-Light (L), DTSS-Deployable (D), DTSS-Base (B) and DTSS-High Volume Map Production (HVMP). Additionally, the DTSS-Survey (S) will provide a downsized configuration capable of supporting a commander's geodetic survey requirements. The DTSS-L is highly mobile and capable of supporting a full range of military operations, as well as peacetime stability and support operations. The DTSS-D provides a COTS configuration that is capable of operating all of the terrain analysis software. The DTSS-D consists of transportable containerized workstations and peripherals that can be set up to augment the tactical configurations. The DTSS-D does not include tactically deployable shelters and vehicles or tactical communications. The DTSS-B was procured in response to urgent



requirements of regional CINCs to develop the capability to generate terrain information over sparsely mapped areas to support training, mission rehearsal, and contingency operations. The DTSS-B is designed to supplement NIMA capabilities at the echelons above corps level by providing quick response, special purpose mapping, terrain analysis, and database generation. The DTSS-B includes a classified component that is capable of handling national technical means information in a secure environment. The DTSS-HVMP will provide a tactical capability to rapidly reproduce large volumes of topographic materiel. DTSS-HVMP will be capable of reproducing information from a variety of digital and hardcopy sources via direct digital interfaces. DTSS systems will be deployed from brigade through EAC. The DTSS systems are being developed as part of the Combat Terrain Information Systems (CTIS) program. DTSS is compatible with and interoperable with the Army Battle Command Systems (ABCS), the Joint Technical Architecture-Army (JTA-A), and the Defense Information Infrastructure Common Operating Environment (DII COE). DTSS provides improved database management and distribution, automated feature extraction, improved tactical decision aid functionality, rapid terrain visualization, and improved map reproduction. The survey section will be downsized to a HMMWV configuration.

**Operational Requirement.** The current terrain analysis, topographic and reproduction support provided by Army Engineer topographic teams is a slow, labor-intensive process that does not meet warfighter needs. The commander must have the ability to rapidly obtain terrain information and topographic products. The DTSS will provide digital maps and updates to commanders and weapon platforms in support of mission planning (e.g., imagery exploitation, cover and concealment, other IPB), rehearsal (e.g., 3D fly through, simulations) and execution (e.g., Common Tactical Picture (CTP), route planning). The DTSS automates terrain analysis and visualization; database development, update, management, and distribution; map reproduction; and geodetic survey support. The Combat Terrain Information Systems (CTIS) modernization plan emphasizes the development of a combined, integrated, tactically deployable, fully autonomous terrain analysis and map reproduction capability.

**Program Status.** The various DTSS variants are under development and are being fielded in every fiscal year. Some have been recently fielded to the 4th Infantry Division and others will be fielded in the next few fiscal years.

### **Standard Robotic Systems Program (SRS)**

**Description.** The SRS will be a family of common components that can be installed in existing military ground and special purpose vehicles for tele-operation. The first systems will provide the capability for remote control of basic vehicle operation such

as driving, turning, stopping, and controlling dozer blades and tracks. Additional capabilities such as



controlling respective mission payloads (referred to as user functions), mission planning, air droppable versions, and extended operational distances will be achieved by evolutionary technological upgrades of the baseline system. This will transition robotic technologies in some unmanned ground vehicles (UGV) from limited line-of-sight (LOS) and tele-operation to extended range non-line-of-sight (NLOS).

**Operational Requirement.** The SRS provides the force with a capability to tele-operate systems when the mission dictates. This increases survivability by removing the soldiers from operating equipment that is in direct contact with performing hazardous tasks.

**Program Status.** The ORD was approved in October 1999 and received a Milestone I/II approval in November 1999.

### **Land Warrior**

**Description.** Land Warrior is a first generation, modular, integrated fighting system for infantry soldiers that incorporates an assortment of systems and components, and technologies into

a lethal, survivable, mobile, and more aware soldier system. Land Warrior combines sensors, computers, lasers, geo-location, and radios with a soldier's mission equipment to achieve the Army Vision of enhancing the individual soldier's lethality, survivability, mobility, and situational awareness. The systems approach optimizes and integrates these capabilities, to include integration with the Army Tactical Internet, without adding to the soldier's combat load or logistical footprint. Land Warrior S&T advanced technology components, to include combat identification, enhanced navigation, and system voice control, will be technically inserted to meet objective requirements.



**Operational Requirements.** The system provides enhanced capabilities to the dismounted soldier in support of the Army Transformation strategy. Dismounted forces will share common Army components and be linked to digital situational data with other weapon systems.

**Program Status.** Currently, Land Warrior is in EMD phase, focusing on the follow-on Research, Development, Test, and Evaluation (RDT&E) contract for Version 1.0. Land Warrior successfully participated in the September 2000 Contingency Force Advanced Warfighting Experiment at JRTC, Fort Polk, Louisiana.

### **Trailer-Mounted Volcano**

**Description.** The trailer-mounted Volcano tailors the existing Volcano system to meet the needs of the IBCT. The trailer-mounted Volcano will utilize an M200 (MICLIC) trailer and two racks with 40 canisters per rack.

#### **Operational Requirement.**

The IBCT requires the capability to emplace scatterable



mines as point obstacles to protect the flanks of the maneuver force.

**Program Status.** Prototype systems are to be built and tested in FY01. These prototypes will be available to the IBCT by 1QFY02.

### **Rapidly Emplaced Bridge System (REBS)**

**Description.** The REBS is a tactical bridge capable of spanning 13-meter gaps and crossing MLC 30 vehicles. The REBS can be rapidly launched and retrieved by a two-man crew and is transportable by C-130. The REBS will either be trailer-mounted or integrated with the CBT.

**Operational Requirement.** The IBCT requires an expedient, tactical gap-crossing capability to maintain freedom of maneuver throughout the area of operations. The IAV and other vehicles in the IBCT will have to cross arroyos, wadis, canals, ditches, and other significant linear obstacles that cannot be bypassed or crossed without REBS.

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**Program Status.** The ORD for REBS was approved 13 September 2000. REBS is funded FY01-05. Fielding of REBS is projected to begin in FY03.

**Light Armored Vehicle III (Interim Armored Vehicle (IAV))**

**Description.** The IAV is based on the Light Armored Vehicle III. The vehicle will have multiple variants to meet operational requirements of the IBCT. The IAV is an eight-wheel, high, hard steel constructed chassis with the ability to have multiple configurations.



**Operational Requirements.** The primary goal of the IAV is to be deployable and responsive. The operational requirements require the IAV to be 100% deployable by C-130, to provide decisive capability in complex, urbanized terrain, and to complement an infantry-based force with full spectrum capabilities to enhance survivability, situational awareness, and lethality.

**Program Status.** The contract was awarded in November 2000 for production schedules to provide platforms at the earliest opportunity.

**Future Combat Systems (FCS)**

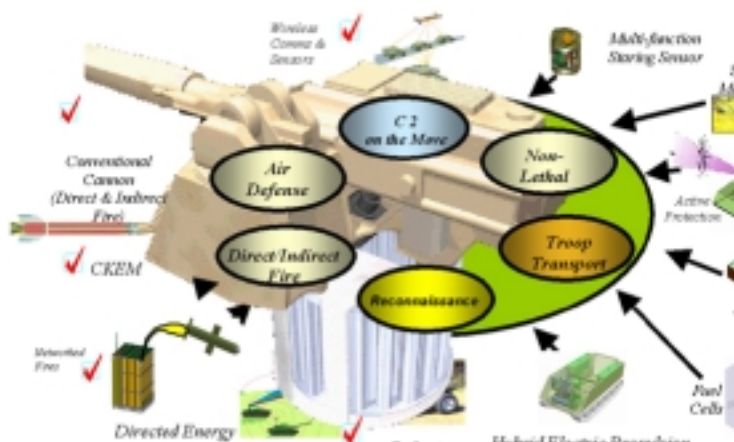
**Description.** The FCS is a system of systems common platform with

specialized subsystems to support infantry, direct fire, engineer, reconnaissance, indirect fire, C2, and other variants. The FCS will be C-130 deployable and have enhanced situational awareness using second generation digitization systems, improved lethality with precision engagement capability, increased survivability with passive and active protection systems, and reduced logistics footprint requirements attained through improved reliability, commonality of components, and reduced resource consumption rates.

**Operational Requirement.** The operational requirements are not finalized. Initial requirements include rapid deployability, precision delivery of both LOS and BLOS munitions effective against a wide range of air and ground targets, multiple mission task capability, countermine capability, and effectiveness in all terrain and weather conditions.

**Program Status.** In response to the draft MNS, the Army partnered with the Defense Advanced Research Projects Agency (DARPA) and established an aggressive, collaborative demonstration program. Congress added \$3.0M in FY00 and the Army reprogrammed \$9.0M additional for a total of \$12M in FY00 to support this effort. The Army budgeted funds for the Army/DARPA collaborative program, identified S&T programs that support the FCS initiative, assigned an Army program manager to DARPA, and signed a Memorandum of Agreement (MOA) between the Army and DARPA. The collaborative program will (1) define and validate FCS design/operational concepts using





modeling and simulation and surrogate exercises; (2) fabricate and test an FCS demonstrator with three or more of its desired functionalities (direct fire, indirect fire, air defense, nonlethality, reconnaissance, C2 on the move, and ability to transport troops) suitable for entering EMD and production; and (3) develop selected enabling technologies for use in the demonstrator. To be included in the program, the technologies must be on a path of sufficient maturity to “skip” the traditional PDRR phase of systems development. The desire is to proceed directly to EMD from the demonstrator program. In FY03, the Army must decide if the FCS demonstrator can meet the capabilities envisioned for the Objective Force and be demonstrated in FY06.

### **Future Scout and Cavalry System (FSCS)**

**Description.** FSCS includes advanced, long-range, multifunction sensors; deployability (one per C-130) and three per C-17; multispectral (visual, thermal, radar, acoustic) signature management; open digital electronic architecture with advanced crew stations to fuse and display data from multiple sources; medium-caliber

cannon and/or missiles for self-protection; and state-of-the-art power and propulsion package with embedded training, prognostics, and diagnostics.

**Operational Requirement.** The FSCS will operate primarily by stealth, within proximity of the threat, and have the

capability to receive and transmit real-time combat information.



**Program Status.** The FY01 funds were zeroed by the Joint Appropriations Committee without prejudice. 7 The Army reprogrammed FY00 funds to support completion of the Advanced Technology Demonstration (ATD) in FY02 as planned. The Army continues to emphasize the need to complete the FSCS ATD in an effort to reduce risk and advance the sensor and platform technologies state-of-the-art to provide options for transition of advanced technologies to the FCS and/or insertion of advanced technologies into the Interim Force.

### **Assessment**

Today, and for the near- and midterms, the mechanized Legacy Force provides the Army's Dominant Maneuver and mobility capability of deploying and conducting Dominant Maneuver operations as part of a joint force. The application of scarce resources means that our extensively task organized forces are equipped with fleets of aging



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vehicles and equipment. The pace of operations continues to increase the fleet age of the legacy systems at a high rate. Lack of sufficient funding to recapitalize critical Legacy Force systems will increase the risk to Dominant Maneuver formation readiness until the Objective Force is fielded.

The modernization and upgrade of Legacy Force systems will remain a critical axis as the Army continues to move toward the Objective Force. Additionally, resources will be required to fully modernize the Counterattack Corps with the M1A2 SEP tank and the Bradley A3. Current funding deficits for recapitalization of BFVS, Abrams, and other systems do not allow the Army to meet the DoD half-life metrics for selected systems by 2010 and maintain that standard thereafter. Significant funding deficits remain for the Abrams fleet. While the AIM program improves fleet age and applies selected upgrades, the service life standards cannot be achieved without additional recapitalization funding. Deficits in funding survivability (improved armor packages to include contingency armor and side armor), lethality (tank extended range munitions), reliability (common Abrams/Crusader engine and under armor auxiliary power unit) do not allow the Army to take full advantage of potential O&S cost savings and lethality while taking risks in survivability. The mobility force funding deficit (Grizzly and Wolverine) does not allow the Dominant Maneuver force to take full advantage of situational awareness and rapid mobility and assumes significant risk in maintaining overmatch before FCS can assume the

role as the dominant Army combat platform. Survivability is a critical component of maintaining combat overmatch and fully funding this effort will significantly improve force protection throughout Transformation. Fully funding tank extended range munitions will take full advantage of the improved target acquisition attained through the SGF upgrade in the M1A2 SEP, expanding the commander's options on the battlefield. The cost savings realized by fully funding the new tank engine and the under armor auxiliary power unit would significantly improve the reliability of the force and empower the joint force commander to conduct sustained Dominant Maneuver to rapidly achieve objectives. Less than full funding assumes risk by not modernizing all legacy formations and the Army prepositioned stocks with the M1A2 SEP tank, M1A1 D, Grizzly, Wolverine, or the Bradley A3. Any delay in the fielding of the FCS will require additional funding for the recapitalization of the Abrams and Bradley platforms as well as other legacy systems. Early deployers relying on APS equipment (not modernized) while the Counterattack Corps deploys by sea encounter significant risk until the Objective Force is fielded.

Although terminated to partially fund Army Transformation, the Grizzly and Wolverine remain critical requirements for the mechanized force to achieve Dominant Maneuver. This termination will require the mechanized force to rely on dwindling and obsolete mobility and countermobility systems until the Objective Force is fielded. Our assault bridging capability is provided by the only M48/M60 system remaining, the

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AVLBs (average fleet age is 24 years and the last AVLB was produced in 1973). The termination of the Grizzly breacher means that our soldiers will once again be removing mines by hand. No alternative solution exists to meet this capability. The deficit in mobility introduces risk by not allowing commanders to take advantage of operational opportunities created by the improved situational awareness provided by digitization. The commander's flexibility of maneuver is compromised.

The Counterattack Corps' required capability is a three mechanized division corps and an armored cavalry regiment with decisive combat overmatch for major regional conflict or Major Theater War (MTW) counteroffensive operations, trained and ready throughout Transformation. The current assessment indicates that the Army's Counterattack Corps requires additional funding to fully achieve Dominant Maneuver and combat overmatch. Current formations are not modernized or recapitalized. Mobility and countermobility platforms are obsolete. Near-term modernization and recapitalization of the maneuver platforms within the Counterattack Corps is expected by FY04 but falls short of fully inserting critical survivability and lethality capabilities unless additional funding is provided. Mobility force obsolescence will continue to hinder maneuver force mobility until key programs are fully funded or the Objective Force is fielded. Reliance on pre-positioned stocks for early deployers will continue to impact overall combat overmatch until the pre-positioned stocks are fully modernized or the Objective Force

becomes the dominant formation in the Army and assumes the role as the Nation's warfighting guarantor on the next battlefield.

## Aviation Forces

### Overview

Today's Army aviation force remains the best in the world. It provides an asymmetric capability unique to the U.S. Army. The Apache Longbow is the finest attack helicopter in the world. The Comanche is the first Army Objective Force system to be fielded that will perform missions throughout the full spectrum of conflict. Comanche provides enhanced survivability, maintainability, lethality, and unprecedented situational awareness. The Black Hawk and Chinook provide unparalleled lift capability to move forces quickly and decisively. Aviation's speed, agility, and lethality increase the commander's options. The Army's continuing investment in aviation will ensure these capabilities do not erode. They reflect the Army's commitment to an Objective Force capability that is responsive, deployable, agile, versatile, lethal, survivable, and sustainable.

The *Army Aviation Modernization Plan*, forwarded to Congress in April 2000, aligns the aviation modernization strategy with the Army Modernization Vision, Strategy, and Plan. It modifies force structure requirements to meet full spectrum mission requirements, retires legacy aircraft, and redesigns the institutional training base to graduate aviators proficient in their "go to war" aircraft.

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Since Operation Desert Storm, aviation's modernization focus was on the dual requirement to attack large fires/maneuver centric targets and air assault light forces. The Aviation Restructure Initiative drove aviation to pure fleet organizations with limited capability to task organize for multifunctional operations. It became apparent early on that, as the Army transformed, aviation too must evolve. This decision was bolstered by a critical imbalance of structure and resources within aviation, particularly within the Strategic Reserve. Recent operational missions in Bosnia and Kosovo uncovered numerous near-term operational and safety deficiencies requiring immediate attention. The subsequent analysis of these issues by Task Force Hawk and The Army Aviation Readiness and Sustainment Task Force, combined with the Army Modernization Strategy, demanded that modernizing Army aviation depart from the 'business as usual' approach and address these issues:

- The requirement to fight across the spectrum of a new operational environment.
- The requirement to sustain warfighting capabilities in the Legacy Force.
- The increasing range of CINC requirements, from engagement to warfighting.
- The need to divest legacy systems no longer contributing to the Army's warfighting capability and focus resources to meet the requirements of transformation to the Interim and Objective Forces.

The Army Aviation Readiness and Sustainment Task Force analysis revealed a number of critical, high-priority readiness, sustainment, and safety issues that are being addressed in the FY02-07 Plan. Many of these—such as SGF and accelerated recapitalization of UH-60, AH-64A, and CH-47—have already received funding and are underway. However, finite resources demand aggressive divestiture of legacy systems and application of resources saved toward interim and objective aviation transformation requirements. Execution of this strategy requires funding the bills associated with retiring legacy AH-1, OH-58A/C, and UH-1 aircraft and fielding these units with modern aircraft.

The *2000 Army Aviation Modernization Plan* took bold steps in defining the strategy necessary to keep aviation integrated in the Army's future operational environment, as well as Legacy, Interim, and Objective Force requirements of our transforming Army. Much work has transpired since this date in refining transition plans, laying the groundwork to begin the transition process, and identifying impediments to successful transition. This annex serves to update the 2000 plan, by refining the "Way Ahead" for Army Aviation.

## **Aviation Modernization in Support of Transformation**

The *Army Aviation Modernization Plan* is integrated into the tenets of the Army Modernization Strategy. The materiel and organizational strategy for Army Aviation are the cornerstones of aviation transformation. The process is underway with the divestiture of the

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AH-1 and planning for UH-1 divestiture in the near term.

## **Tenets of Modernization Strategy**

### **Focused Science and Technology Effort**

The Army Aviation S&T program provides the technologies needed to develop next generation/future systems such as the Future Transport Rotorcraft (FTR), and to sustain and upgrade the operational capabilities of the legacy fleet. These enhanced capabilities are needed to meet the requirements of the future Objective Force as articulated in the Objective Force capabilities statements in TRADOC Pamphlet 525-66. To support these requirements, aviation S&T programs are focused on improvements in turbine engines, drive trains, flight control, rotor blade systems, aircraft survivability equipment, aircraft structural designs and materials, avionics systems design and integration, sensors and weapon systems, and unmanned aerial vehicle (UAV) teaming. Detailed descriptions of these programs can be found in the *Army Science and Technology Master Plan*.

## **Transforming**

### **Materiel Strategy**

The materiel vision for aviation remains largely unchanged from that of previous plans. What has changed is the additional requirement to fit this materiel modernization strategy within the framework of organizational transformation. Aviation's primary aircraft modernization programs continue to be the RAH-66 Comanche, the AH-64D Apache Longbow, the UH-

60M Modernized Black Hawk, and the CH-47F Chinook. Supporting programs remain focused on meeting modernization requirements necessary to execute these aircraft modernization programs, as well as addressing near-term capability shortfalls and near- to mid-term requirements such as digitization, Global Air Traffic Management (GATM), logistics automation, and fleet recapitalization.

### **Organizational Strategy**



Materiel modernization alone will not address all of aviation's capability shortcomings. Current aviation force structure is not well suited for stability and support mission requirements. Current aviation battalions must be more deployable, tailorable, and sustainable to meet Army operational requirements. To address these shortcomings, aviation will transform to a structure designed around the multifunctional battalion. This multifunctional battalion is designed with a balanced mixture of attack, reconnaissance, and utility aircraft and augmented with more robust staffs and logistical support. Achieving organizational modernization while keeping our materiel modernization programs on track is not without funding risks. The difficult decision to

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accept risk in the near- to midterms by resourcing units in both the AC and RC at less than full authorizations and the realignment of flight training at the schoolhouse provides the conditions necessary to lessen transformation risk and develop an executable plan.

## **Maintaining and Improving**

As the Army moves toward a more deployable and mobile force, aviation will be relied upon to an even greater degree. Reconnaissance and security will become key to protecting the fast-paced, transitional forces of the future. Aviation's lift capabilities will sustain the maneuver force and provide this force the mobility to dictate the battle. Meeting these future needs requires an Aviation modernization strategy that manages fleet life to minimize obsolescing and unsupportable aircraft while meeting the Army's mission requirements for aviation.

- The AH-64D is a key element of the Army's combat overmatch objective, providing unprecedented firepower, survivability, and capability to fight worldwide day, night, or in adverse weather. The AH-64D Apache Longbow represents a key component of the Army's strategy to incrementally improve capability to maintain combat overmatch. Apache Longbow mitigates risk by maintaining combat overmatch in the Legacy Force, and provides an interim bridging capability in the multifunctional battalions of the Aviation Objective Force.
- The UH-60 remains the foundation of the Army's utility helicopter force. The HH-60Q and UH-60M

programs address the operational and sustainment problems of the aging UH-60A fleet.

- The CH-47 provides the Army's only heavy-lift helicopter support. An engine upgrade coupled with the CH-47F recapitalization program will address capability shortfalls and extend aircraft life.
- Additional readiness, sustainment, and safety upgrades are programmed for the AH-64, UH-60, OH-58D, and CH-47.
- Fixed-wing modernization is centered on reducing the overall cost of fleet ownership and addressing future GATM requirements for airspace usage.

Aviation's supporting programs (avionics, aircraft survivability equipment, air traffic services, aviation ground support equipment, aircrew integrated systems, and weapons), S&T programs, and Training Aids, Devices, Simulators and Simulations (TADSS) provide the programs and technologies required to sustain, recapitalize, or field next generation/future systems.

## **Functional Components of Aviation Modernization**

### **Transition**

The transition strategy for aviation retires legacy AH-1, OH-58C, and UH-1 aircraft no later than the end of FY07. This is accomplished by accepting risk and aircraft resourcing in the AC and RC to support fleet-wide fielding under the new multifunctional battalion structure with modern aircraft (AH-64A, AH-64D, OH-58D, and UH-



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60). This reduced level of resourcing will be required until sufficient RAH-66 Comanche and UH-60 aircraft can be procured to allow fielding to full requirements. Under current resourcing, the retention of the OH-58D Kiowa Warrior will be required until beyond FY10. This drives the requirement to continue the SEP modifications (crashworthy seats, cockpit air bags, improved displays, upgraded engine, and limited digitization) to address engine ingestion problems, which are driving up support costs, and to examine the long-term supportability and obsolescence issues (particularly with the mast-mounted sight).

To execute the transition strategy, RAH-66 must remain on schedule, and transition costs (fielding, training, and equipment/parts) must be funded to allow for cascading of modern aircraft and support equipment to the ARNG. The resourcing risk created by inadequate numbers of UH-60s will also extend through the far term without an increase in currently programmed UH-60 procurement. With the exception of the Air Assault Division (which converts to the objective structure in the far term), the aviation transformation does little to impact cargo aircraft (CH-47) requirements and fielding. Affordability and objective requirements for the FTR will determine if additional CH-47Ds must be remanufactured into the CH-47F configuration. The FTR is the Army's objective heavy lift aircraft, capable of significantly greater range and payloads than the CH-47 for cargo/troop transport to meet the transport requirements of the FCS.

## Discussion of equipment

### **AH-64D Apache Longbow**

**Description.** The AH-64D is a key element of the Army's ability to maintain combat overmatch in the Legacy Force. The AH-64D remanufacture effort incorporates a millimeter wave Fire Control Radar (FCR), Radar Frequency Interferometer (RFI), fire-and-forget radar-guided HELLFIRE missile, and cockpit management and digitization enhancements.



**Program Status.** A total of 227 FCRs are programmed for procurement. Current funding limits AH-64D production to 501 aircraft, leaving 241 AH-64As in the fleet and falling 99 aircraft short of the requirement under the objective aviation force.

This reduction (from 530 in the FY01-05 Plan) was driven by the requirement to correct priority recapitalization issues not addressed through the AH-64D program. Each of these 501 AH-64Ds will also receive a modernized SGF target acquisition/pilotage system, replacing the maintenance-intensive, first generation, common module system, increasing target acquisition range, and

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improving pilotage system resolution and safety. To fully extend the AH-64 life, additional recapitalization requirements remain, particularly for certain dynamic components such as the main rotor head/blades, drive system, and transmission. The AH-64D will begin reaching its replacement point in FY18. As noted above, the RAH-66 is the designated replacement for the AH-64 in the far term.

### **UH-60L Black Hawk**

**Description.** The UH-60 is the Army's objective utility/Medical Evacuation (MEDEVAC) helicopter. The UH-60 is relied upon to perform air assault, air movement, MEDEVAC, and airborne C2. The current utility fleet consists of the UH-1 and UH-60A/L/Q.

**Program Status.** Approximately 560 legacy UH-1s remain in the force, possessing inadequate lift, range, survivability, and speed to accomplish utility requirements. These aircraft have become increasingly problematic, with numerous groundings due to safety risks and steadily increasing operating and support costs. At the end of the FY02-07 Plan, the UH-60 shortage will be approximately 330 aircraft. Additional procurement has been programmed in the far term (10 per year) to narrow this gap. Just over 900 UH-60As, which began production in 1979, are in critical need of recapitalization. Limited procurement of UH-60Ls and the rate that UH-60As are being scheduled for recapitalization will posture the ARNG to experience difficulty maintaining unit readiness. This impact is due to a lack of aircraft availability and decreasing operational readiness rates. The UH-60M



recapitalization program is scheduled to begin production in FY03 to bring these aircraft up to UH-60L standards, incorporate more modern and interoperable avionics, and extend aircraft life. The UH-60M MEDEVAC (to be designated HH-60M) will also incorporate medical equipment upgrades (telemedicine, enhanced MEDEVAC kit, built-in rescue hoists, and onboard oxygen generation). In addition to detailing the UH-60M requirements, the recently approved UH-60M modernization ORD details improved lift and range requirements for a Block 2 upgrade, referred to as the UH-60X. This program, now known as the Future Utility Rotorcraft (FUR), is facing technology and funding challenges. Procurement of the FUR is expected to occur sometime after 2010.

### **CH-47 Chinook**

**Description.** The CH-47 Chinook modernization program includes an engine upgrade and recapitalization of the CH-47D to the CH-47F. These efforts buy back CH-47D lift capabilities, insert digital capabilities, and extend aircraft life by approximately 20 years.

**Program Status.** The engine upgrade production began in FY00 and will



continue throughout the FY02-07 Plan. It will be applied fleet-wide to restore lift capabilities lost through years of aircraft weight growth caused by modifications. The CH-47F modifications will remanufacture the aircraft, reduce aircraft vibration (thereby lowering O&S costs), and insert digital technologies to support interconnectivity and situational awareness. The CH-47F modifications will begin in FY02 and ramp to a maximum production rate of 26 aircraft per year in FY04. Anticipating the introduction of the Joint Transport Rotorcraft in 2015, the Army only planned for 300 of the 431 CH-47 aircraft in the fleet for recapitalization.

### **RAH-66 Comanche**

**Description.** The Comanche is the Army's objective reconnaissance and attack aircraft. It is a twin engine (T-801) aircraft with all-composite fuselage, second generation targeting and pilotage sensors, and low observable design. Both cockpits are identical, allowing all pilotage and mission equipment tasks to be conducted from either seat and reducing the pilot training burden. The weapon systems are stowed internally until needed and include laser-guided and Longbow HELLFIRE missiles, air-to-air missiles, Hydra-70 rockets, and a 20mm Gatling gun. Supportability

(based on two-level maintenance) has been a key design parameter of the Comanche program. Supportability features include embedded diagnostics, minimal special tools, a



reduction in support equipment requirements, and fewer parts. The Comanche is self-deployable 1,206 nautical miles on one fuel load in ten hours, and is capable of deploying via air transport to any theater in 96 hours.

**Program Status.** Two RAH-66 prototypes are currently flying in the EMD phase. The current program initiates production in FY04, leading to an IOC in December 2006 and a production ramp to 62 aircraft per year in FY10. The recent program restructure, accomplished without increasing program cost or risk, accelerates the integration of the FCR and allows demonstration of this capability at IOC. The RAH-66 acquisition objective is 1,213. Comanche remains the most likely replacement for the AH-64 in the far term. This would further reduce the training burden and simplify supportability requirements.

### **OH 58D Kiowa Warrior**

**Description.** The OH 58D continues as the armed reconnaissance helicopter for attack and air cavalry

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units until fielding of the RAH-66 begins. It is capable of performing reconnaissance security, C2, target acquisition/designation, and defensive air combat missions.



**Program Status.** The SEP program began in 1997 and will be completed in 2005. The OH 58D will be replaced by the Comanche beginning in 2007 and is projected for retirement by 2014.

### **Fixed Wing Modernization**

The Army's fixed-wing fleet performs Operational Support Airlift (OSA), Special Electronic Mission (SEMA), cargo, and dedicated support missions. The goal of fixed-wing modernization is to insure mission effectiveness is maintained while reducing the overall cost of fleet ownership. The major thrust within fixed-wing modernization is procurement of the UC-35 medium range jet to replace aging, turboprop C-12s. Fixed wing modernization also includes GATM compliance across the fleet and cockpit digitization. Efforts are currently underway to refine fixed-wing doctrine in accordance with objective Army requirements. This effort will provide the direction and focus to allow identification of requirements for the next generation of fixed-wing aircraft.

### **Supporting Capabilities Modernization**

Essential to the support, sustainment, and modernization of the aircraft programs discussed above are aviation's supporting capabilities. These programs (aircraft survivability equipment, avionics, aircrew integrated systems, air traffic services/air traffic control, aviation ground support equipment, weapons, TADSS, and essential S&T) impact aviation's efforts to sustain and recapitalize the Legacy Force and field aviation Objective Force capabilities.

### **Aircraft Survivability Equipment (ASE).**

ASE is critical to aircraft survivability, particularly in the lethal threat environments that aviation forces will face in the 21st century. The Suite of Integrated Infrared Countermeasure (SIIRCM) that includes the Advance Threat Infrared Countermeasures/Common Missile Warning System (ATIRCM/CMWS) system and Suite of Integrated Radio Frequency Countermeasures (SIRFC) are the two most critical ASE programs for Army aviation. SIIRCM is the next generation of infrared countermeasures and will include passive missile warning, active IR jamming, and IR countermeasures expendables. SIIRCM is required for 2,559 aircraft with FUE scheduled for FY03. Funding for SIIRCM supports limited production beginning FY02 and 151 systems procured by the end of FY07. The SIRFC consists of the Advanced Threat Radar Warning Receiver (ATRWR) and the Advanced Threat Radar Jammer (ATRJ). The SIRFC program has been deferred until beyond FY05 for all aircraft except



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for Special Operations Aviation (SOA), risking vulnerability in the near term against radio frequency (RF) threat systems. Another important ASE system, the AN/AVR-2A, is a passive laser-warning receiver. It receives, processes, and displays illumination by laser designators, rangefinders, and beam riding missiles providing sufficient warning to the crew to allow evasive maneuver. Approximately 50% of the required systems have been procured, but the remaining requirement is unfunded.

**Aviation Electronics (Avionics).**

Essential to achieving Information Dominance, avionics programs are designed to ensure aviation meets combined arms and joint requirements for C2, mission planning, communications, navigation (including worldwide civil airspace), information interchange, and interoperability. Avionics funding and production schedules are not synchronized with the current schedule for digitizing the Army. Critical aviation requirements exist for the Joint Tactical Radio System (JTRS) as the objective radio supporting robust Tactical Internet connectivity on the digitized battlefield. Embedded Battle Command (EBC) software in the Improved Data Modem (IDM) is essential to meet aviation interoperability requirements of the Tactical Internet in the near term. Key to effective operations is the precision navigation capability provided by the GPS systems supporting scout/attack and cargo/utility aircraft. GPS preplanned product improvement must be supported to overcome susceptibility to enemy countermeasures. Efforts are underway to begin fielding a modern

airborne C2 system for the UH-60 (Army Airborne Command and Control System (A2C2S)) and aviation enhancements such as the Aviation Mission Planning System and improved high frequency radios to the Army's digital TOC architecture prior to the Digital Corps Exercises in FY04. As early as 2001, Army aircraft will be mandated to comply with GATM requirements in Europe, followed by other geographical regions. GATM requirements, which are only partially funded, vary by aircraft and region and must be addressed to permit continued flight in civil airspace and minimized operational flight restrictions.

**Aircrew Integrated Systems (ACIS).**

The ACIS program encompasses items of equipment needed to protect, sustain, and enhance the performance of Army aircrews during flight, ground, and survival-evasion operations. The primary ACIS program is Air Warrior. Air Warrior is an integrated, mission-tailorable ensemble that improves aircrew performance in Mission Oriented Protective Posture (MOPP IV), reduces weight and bulk, and improves mobility and survivability. It reduces human physiological limitations that preclude full utilization of aircraft capabilities. Subsystems include Laser Eye Protection, Joint Protective Aircrew Ensemble, Aircrew Microclimatic Cooling System, Combat Survivor Evader Locator, Modular Integrated Helmet Display System, Joint Service Aircrew Mask, and Electronic Data Manager. Recent funding cuts have stretched Air Warrior procurement out to FY16 to fulfill aviation requirements.



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**Air Traffic Services/Air Traffic Control (ATS/ATC).** Army ATS is an important but often overlooked component of Army aviation and is critical to aviation safety and survivability on the modern battlefield. Tactical ATC supports Army and land component commanders' automated airspace C2 requirements and ATC for joint civil coalition and service aircraft operating in terminal and rear areas. Additionally, ATS are critical to the support of our fixed-base force projection platforms and the support of safe and efficient movement of Army aircraft operating from Army airfields worldwide. Major ATS programs include the Air Traffic Navigation, Integration, and Control System (ATNAVICS), Tactical Airspace Integration System (TAIS), and the Mobile Tower System (MOTS). Fixed-base ATC is closely aligned with the Federal Aviation Administration's (FAA) National Airspace System (NAS) modernization efforts. Major programs include the Digital Airspace Surveillance Radar (DASR), the DoD Advanced Automation System (DAAS), Fixed Base Precision Approach Radar (FPAR), and Airfield Status Automation System (ASAS). The majority of ATS/ATC programs have had procurement stretched beyond the planning period. In addition, a critical need exists to fund ABCS connectivity into TAIS and to replace obsolescing tower simulators with the Enhanced Tower Simulator (ETOS).

**Aviation Ground Support Equipment (AGSE).** Future aviation maintenance will incorporate total automation, strategic modularity, and multifunctionality and will support a reduced logistics footprint. The

objective logistics architecture will be based upon the Combat Service Support Control System (CSSCS) and the Global Combat Support System-Army (GCSS-Army). Modernization of AGSE focuses on two areas of development: modernization of Test, Measurement, and Diagnostics Equipment (TMDE) and recapitalization of aging AGSE. The modernization of AGSE remains a challenge with the limited funding available. However, a modern logistics system is mandatory to achieve the Army's strategic responsiveness goals. Unfunded/underfunded programs include the Digital Source Collector, Aviation Intermediate Maintenance Containerization and Modernization Program (AVIM-CAMP), Shop Equipment Contact Maintenance, and the New Aviation Ground Power System (NAPS).

**Weapons.** Weapon system modernization is essential to maintain or improve combat overmatch and to provide for aircraft self-protection. Production of the Longbow HELLFIRE missile, which began in FY97, will end at 12,905 missiles in FY03. The requirements for a modernized HELLFIRE are being developed to replace the laser HELLFIRE missile, whose shelf life will expire by 2014. Modernized HELLFIRE will be aviation's objective heavy missile system, combining the precision-point target capability of the laser HELLFIRE and the adverse weather/obscured battlefield/fire-and-forget capability of the Longbow HELLFIRE. FUE for Modernized HELLFIRE is projected for the FY08 timeframe. The Advanced Precision Kill Weapon System (APKWS) remains unfunded. This weapon is intended to fill the gap

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between the current unguided 2.75" Hydra-70 rocket system and the HELLFIRE antitank missile system. It will provide aviation with a precision capability against lightly armored targets at significantly lower cost and weight. The M-60D door gun for the UH-60 and CH-47 has been in the inventory since the 1960s and is becoming increasingly unreliable and costly to maintain. The new M240D, a variant of the ground M240 7.62mm machine gun, will provide greatly improved reliability and increased rates of fire.

**Training Aids, Devices, Simulators, and Simulations (TADSS).** TADSS modernization is critical to aviation combat effectiveness and our ability to train effectively within resource constraints. TADSS modernization hinges on:

- Fully resourcing the Aviation Combined Arms Training Strategy (CATS) to validate the training conducted in the virtual and constructive environment.
- Fielding the Aviation Combined Arms Tactical Trainer-Aviation Reconfigurable Manned Simulator (AVCATT-A).
- Maintaining simulator concurrency in legacy aircraft simulators to ensure these devices replicate the aircraft they are designed to support.

Another important facet of training is implementation of Flight School XXI. Flight School XXI realigns the flight school to meet warfighting

requirements by producing aviators who arrive at their initial duty station basic mission qualified. It eliminates all UH-1 and OH-58C training aircraft, returns instructor pilots to the field, and leverages simulator potential. Additional aircraft requirements to execute this strategy are 51 TH-67s, 45 UH-60s, 11 OH-58Ds, 13 AH-64s, and 16 CH-47s. The aviation transition strategy accounts for these requirements with the exception of the additional TH-67s.

## Assessment

The *Army Aviation Modernization Plan* aligns the aviation strategy with the Army Vision, modifies force structure requirements to meet full spectrum mission requirements, retires older/obsolete aircraft, and redesigns the institutional training base to graduate aviators proficient in their “go to war” aircraft. Execution of this strategy requires the Army to fund the bills associated with retiring legacy AH-1, OH-58A/C, and UH-1 aircraft and fielding these units with modern aircraft. A number of critical, high-priority readiness, sustainment, and safety issues have been identified which must also be addressed in the near term. Funding decrements have also resulted in slipped, stretched, and unfunded programs. This is particularly troublesome in the digitization area, where aviation does not appear postured to be a full-time player on the digital battlefield in the timeframe established by the Army.

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## ANNEX B: FULL DIMENSIONAL PROTECTION

### General

**Full Dimensional Protection** is the ability of the joint force to protect its personnel and other assets required to decisively execute assigned tasks. Full Dimensional Protection is achieved through the tailored selection and application of multilayered active and passive measures; within the domains of air, land, sea, space and information; across the range of military operations; and with an acceptable level of risk. Commanders will thoroughly assess and manage risk as they apply protective measures to specific operations and will ensure that an appropriate level of safety, compatible with other mission objectives, is provided for all assets.

The overall goal of Army Transformation is the creation of an Objective Force that is dominant across the full spectrum of military operations—persuasive in peace, decisive in war, preeminent in any form of conflict. Full Dimensional Protection conserves the force's fighting potential so that it can be applied at a decisive time and place. Implementing this fundamental concept requires control of the area of operations to ensure friendly forces maintain freedom of action during deployment, maneuver, and engagement. It also requires capabilities to counter enemy systems used to locate, strike, and destroy friendly forces. Additionally, operational facilities, including civil infrastructure, and forces must be protected from concentrated enemy air, space, ground, and sea attacks;

nuclear, biological, and chemical (NBC) weapons; and terrorists. As our forces continue to operate across the full spectrum of operations, it is crucial to its dominance that we take all possible measures to protect the force and ensure its survival. **Survivability** also affects the perceptions of our adversaries about their ability to fight and win against U.S. forces. But the survivability of the Objective Force must extend beyond combat operations across the full spectrum of operations, and it must address current and emerging asymmetric capabilities. The Objective Force must demonstrate to potential adversaries the futility of pursuing asymmetric capabilities as a viable threat. It must ensure U.S. forces retain strategic, operational, and tactical positional advantage over adversaries and can conduct high-tempo, sustainable operations despite the presence, threat, or use of these weapons. Conditions must be established and maintained to ensure the survivability of individuals, units, and supporting infrastructure. Thus, survivability cannot depend on only intrinsic capabilities, but must be a combination of active and passive measures executed by the Objective Force. To meet these challenges, the Army must have modern equipment and an array of forces that incorporate new technologies to meet mission requirements and counter emerging threat capabilities.

This annex focuses on the Army's Objective Force characteristic that is dedicated to Full Dimensional Protection—Survivability.

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This includes Air and Missile Defense (AMD) forces, NBC defense assets, space control assets, Military Police, as well as certain Engineer assets. To ensure that the Objective Force is protected throughout the full spectrum of operations, these assets must be responsive, versatile, deployable and sustainable for the duration of operations. The lethality of our active defense protection capability should minimize effects on our forces to conserve its fighting potential.

As an example, the Medium Extended Air Defense System (MEADS) is an Army objective system designed to provide low- to high-altitude defense, theater ballistic missile defense, and cruise missile defense of the maneuvering force and fixed assets. It will need to be deployable to provide protection to early entry forces at points of debarkation. It will be

responsive and agile to provide protection of maneuver forces. It will be lethal to minimize the effects of hostile air or missile attacks to forces on the ground. It will be sustainable to support any long-term operations similar to the present day AMD mission in Southwest Asia.

Information Superiority is a key enabler for systems providing a Full Dimensional Protection capability. Target detection, classification, and combat identification information must be determined and disseminated. The Sentinel radar and the Forward Area Air Defense Command and Control (FAAD C2) system are examples of AMD assets that enable Objective AMD forces to accomplish their Full Dimensional Protection mission by reducing fratricide and maximizing combat effectiveness.

## **Air and Missile Defense**

### **Overview**

Air and Missile Defense systems, both national and theater, provide the necessary capabilities for Full Dimensional Protection to meet the current and future requirements in support of our National Security and National Military Strategies. Theater systems provide commanders and operators an integrated real-time air picture, weapon system cueing, tracking, friend-or-foe identification, and weapon systems to protect ground forces, critical assets, and geopolitical targets from Unmanned Aerial Vehicles (UAVs), helicopters, fixed-wing aircraft, and ballistic missiles. The National Missile Defense (NMD) System will provide the National Command Authorities and CINC NORAD with acquisition, tracking, discrimination, destruction, and kill assessments of intercontinental ballistic missile-delivered warheads directed against the United States territory.

The Air and Missile Defense (AMD) force is essential to the joint and combined warfight, providing strategically responsive, dominant

AMD from mud to space. AMD is a strategically, operationally, and tactically versatile combat multiplier that masters change today and well

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into the 21st century, to provide Full Dimensional Protection. It is the preeminent AMD force in the world, manned by confident, competent, caring soldiers and leaders with expanding opportunities for all.

## **Mission**

During Army Transformation, the overall AMD mission remains virtually unchanged—protect the force and selected geopolitical assets, to include the United States, from aerial attack, missile attack, and surveillance. Additional subordinate or implied missions and functions will emerge with respect to the type of operation (across the spectrum of operations), the echelon of employment, and the size and complexity of the expected threat set.

**Description.** AMD systems are organic to divisions, corps, and theater forces in the Legacy, Interim, and Objective Forces. The NMD system is a strategic system.

In the Legacy Force, the AMD units in the heavy, light, or special divisions contain Bradley Linebacker, Avenger, Stinger Man-Portable Air Defense System (MANPADS), Sentinel, and Forward Area Air Defense (FAAD) command and control (C2) systems. The corps AMD units contain Patriot, Avenger, Sentinel, and FAAD C2 systems. The AMD force at theater level consists of Patriot, Avenger, Sentinel, FAAD C2, and the Joint Tactical Ground Station/ Multi-mission Mobile Processor (JTAGS/M3P). The elements of the modularly configured AMD Planning and Control System (AMDPCS) appear throughout the

force, from the theater-level Army Air and Missile Defense Command to battery level.

In the **Objective Force**, the AMD units will contain Avengers, Sentinels, Air and Missile Defense Planning and Control Systems (AMDPCSs), FAAD C2 systems, and High-Mobility Multipurpose Wheeled Vehicle (HMMWV)-mounted Advanced Medium Range Air-to-Air Missile system (HUMRAAMs). The Enhanced Area Air Defense (EAAD) system (formerly the Enhanced Counter-Air Capability (ECAC) system) will replace Bradley Linebacker, Avenger, and HUMRAAM in divisional and echelons above division units starting in FY15. The EAAD system will be a family of kinetic energy and directed energy weapon components that are members of an integrated air defense system. The corps AMD units contain Patriot (replaced by MEADS beginning in FY12), Avengers, Sentinels, AMDPCSs, FAAD C2 systems, HUMRAAMs, and EAAD components. The theater-level AMD force consists of Patriot, Theater High Altitude Area Defense (THAAD), Avengers, AMDPCSs, FAAD C2, Sentinels, JTAGS/M3P, and EAAD components. The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) is task organized into the AMD force and deployed in both corps and theater areas in support of AMD forces and missions. At the national level, NMD will be under control of CINC NORAD.

The Objective Force AMD package contains the requisite weapon, sensor, and C2 components organized in battle elements. Battle elements are



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mission-tailored, force projection organizations. These elements and components are integrated into the AMD “plug and fight” architecture and, simultaneously, the joint AMD Battle Management Command, Control, Communications, Computers, and Intelligence (BMC4I) network. AMD personnel are attached to applicable joint and maneuver force headquarters to establish and maintain the required linkages with deployed joint air defense and air control elements and to ensure AMD protection of commanders’ critical assets.

The transforming AMD force (primarily the objective AMD force) uses plug and fight and expanded battlespace engagements to prosecute operations. The plug and fight capability is fundamental to and inherent in all future AMD operations. Plug and fight constitutes the ability of system functional components (weapons, sensors, and C2 elements), not systems, to move into designated positions, emplace, immediately establish communications, and automatically integrate into the defense with control exercised by a designated AMD BMC4I center.

The organization of weapons, sensors, and C2 elements is accomplished through a process of affiliation. Organizations are dynamically tailored in composition, mission, and tactics to best accomplish the defined objective. In this manner, ad hoc task organizations are formed that operate as seamless, cohesive entities. Units in the defense can share organic assets, eliminating the traditional unit paradigms of fixed size, direct ownership, and the habitual

association between organic weapons, launchers, sensors, and C2. In essence, most AMD systems as they are known today will lose their identity over time. Some legacy systems, such as Patriot, however, will likely continue to plug and fight at the system, rather than the component, level.

### **Role in the Army**

AMD is the Nation’s only final protective fires for National Missile Defense (NMD) and Theater Missile Defense (TMD). The threat of aerial and missile attack is very real today, continues to grow, and poses a danger not only to U.S. troops overseas but also to Americans at home. North Korea, Iran and Iraq are acquiring ballistic missiles with NBC payloads. Ballistic missiles will target troop concentrations, logistical areas, airports and seaports, and geopolitical/ population centers at home and around the world.

AMD forces perform prominent roles in defensive and offensive information warfare to sustain or retain information superiority. Primary functions include protecting C4ISR facilities from missile and air attacks, providing aerial battlespace situational knowledge and early warning, and denying the threat of aerial surveillance of the force. The initial NMD system defends the United States territory against a limited ballistic missile attack, whether accidental, unauthorized, or deliberate. This initial system is expandable to provide global missile defense protection when necessary.

AMD defensive information warfare protects U.S. forces information

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operations. AMD weapon systems defend information systems assets at the theater, corps, and division levels. AMD offensive information warfare operations degrade an adversary's ability to collect information. AMD forces engage the Reconnaissance Surveillance and Target Acquisition (RSTA) platforms (UAV or fixed-wing) to deny aerial intelligence collection. The Army AMD radar network is fully integrated into a consortium of national, joint, space, aerial, and ground sensors, transmitting real-time or near-real-time air battle space knowledge and early warning to commanders at all levels.

## **AMD Modernization in Support of Transformation**

### **Overview**

The Army has begun a revitalization program aimed at transforming today's Army into an Objective Force capable of domination across the full spectrum of operations. The ultimate goal of modernization is to provide the right capabilities to combat-ready soldiers, capable of carrying out the mission. As the Army transitions to new doctrine, equipment, and organization, AMD forces will continue and expand modernization initiatives already underway to transform in stride with the rest of the Army.

**Legacy Force.** Even though the Legacy Force faces obsolescence issues, it must respond when, where, and as needed until systems are retired. As AMD addresses modernization, it cannot overlook its legacy systems. Improvements to legacy systems (Patriot, Stinger,

Avenger, AMDPCS, FAAD C2, Sentinel, and Bradley Linebacker) must continue until they are retired to ensure that they are useful/effective for the Interim and Objective Forces. Robust recapitalization programs are needed to fund these improvements and maintain these systems until their retirement. Patriot is the only AMD system currently approved for recapitalization.

**Interim Force.** The Interim Force units will be supported by currently available equipment plus HUMRAAM, an interim system.

**Objective Force.** The Objective Force reflects the culmination of ongoing system enhancements, new system capabilities, and state-of-the-art technologies. It is modular, mobile, tailorable, and interoperable with Army forces and joint elements and fully capable of protecting the forces across the spectrum of operations. Research and development of AMD objective systems is geared toward this end. The introduction of THAAD, MEADS, and JLENS will enhance protection of maneuver forces and other critical assets throughout the theater. MEADS is the gateway system for the objective AMD force and will eventually replace Patriot. The EAAD system of components is the objective solution to Short-Range Air Defense (SHORAD) and to rocket, artillery, and mortar threats, and will eventually replace Stinger-based platforms. To protect its force generation capability, a cornerstone of Objective Force requirements, the Transformation force will rely on the NMD system for defense of the United States. A multi-tiered, multi-Service NMD system

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could eventually be capable of providing defense for forward-deployed troops as well, and could support future allied/coalition concepts, ensuring Objective Force access and providing credible flexible deterrent options (FDOs).

## Summary

Tomorrow's plug and fight capability and battle elements are the foundation for a bold shift in how we will equip and organize our TMD forces. AMD will develop and field modular equipment—components instead of traditional system packages. Weapon, sensor, and C4I components will then be integrated into and deployed as right-sized, configurable, mission-tailorable battle elements.

These versatile units will be mobile, deployable, survivable, and lethal. System components and battle elements will be interoperable with other AMD elements, Army forces, and service AMD systems. High-to-Medium Altitude Air Defense (HIMAD) and SHORAD systems, as we know them today, will be subsumed in this emerging AMD force. As it transforms, AMD will be in line with the Army Vision of **strategic responsiveness, deployability, agility, versatility, lethality, survivability, and sustainability**.

NMD implicitly supports Army Transformation, ensuring Army force responsiveness by protecting our ability to mobilize and project power. NMD will have the capability to engage Intercontinental Ballistic Missiles (ICBMs), potentially armed with weapons of mass destruction, at

altitudes that mitigate or negate their effects. Future architectures will enhance capabilities to meet more advanced threats and at longer ranges.

The goal of Army Modernization is to provide combat-ready soldiers capable of carrying out the mission. The goal of AMD is to provide these soldiers with the equipment necessary to carry out the mission. In this respect, AMD is addressing these needs for the Legacy, Interim and Objective Forces—we are on the move and moving out as the rest of the Army transforms.

## Discussion of Equipment

### **Bradley Linebacker**

**Description.** The Bradley Linebacker has an externally mounted launcher that can fire four Stinger missiles while moving. It provides armored protection for the Stinger team during engagements.

**Operational Requirement.** It provides heavy maneuver forces with dedicated, low-altitude air and missile defense against cruise missiles, UAVs, helicopters, and fixed-wing aircraft.

**Program Status.** The program is in the procurement cycle. Additional production has been awarded from FY04 to FY07. Funds the procurement of 25 additional Linebackers, six Man-Portable Air Defense System under Armor (MUAs), and training devices. Under the new force structure delineated in the AMD transformation plan, only 16 Linebackers will be required in each heavy division. This reduces the total number of additional

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Linebackers needed for the Army to 24. Redistribution of existing Linebackers will field the 1<sup>st</sup> Infantry Division, 1<sup>st</sup> Armored Division, and the 2<sup>nd</sup> Infantry Division. The FY02 President's Budget (PB02) also funds 15 tabletop trainers, 50 precision gunnery system upgrades, 60 through-sight videos, and 12 force-on-force trainers.

While sufficient Bradley Linebackers and MUAs are being procured to field to the heavy division AMD battalions in accordance with the AMD transformation plan, these systems are not fielded until FY04. Alternatives are being developed to obtain earlier procurement funding (in FY03) and begin fielding in the FY03-05 period.

### **Stinger Upgrades**

**Description.** The Stinger upgrade is mounted on a variety of platforms, and can also be shoulder fired. Its range is 3kms-plus. It is the only air defense weapon system in the forward area.

**Operational Requirement.** It provides low-altitude, short-range air defense against cruise missiles, UAVs, helicopters and fixed-wing aircraft.

**Program Description.** Program is in the procurement cycle. The PB02 funds the upgrade of 6,724 reprogrammable microprocessor (RMP) missiles to the Block I configuration and modifications to platforms to take advantage of the missile improvement. The PB02 also upgrades Stinger troop proficiency trainers beginning in FY01. The upgrade includes multiple scenario locations, in various settings, and more

aircraft models. Additionally, the upgrade will incorporate improved scenario generation capabilities. Platform modifications to take advantage of the Block I missile improvements will be completed by FY04.

### **Avenger**

**Description.** The Avenger consists of two Stinger launcher pods (eight ready missiles), a .50-caliber machinegun, a forward-looking infrared (FLIR) system, a laser rangefinder, and an identification friend-or-foe system mounted on a HMMWV chassis.



**Operational Requirement.** It provides low-altitude air, short-range, day-night air defense against UAVs, helicopters, and fixed-wing aircraft for division through theater forces.

**Program Status.** Program is in the procurement cycle. Procurement ends in FY01. Modifications continue until FY07. The PB02 funds 36 fire units, 615 slew-to-cue/common fire control computer/automatic video tracker kits, 176 FLIRs/laser rangefinders, and required trainer upgrades. The PB02 funds the production and fielding of 36 Avenger fire units, 30 tabletop trainers, 52 tabletop trainers upgrades, 288 blank firing adapters, 10 institutional conduct of fire trainer upgrades, and an embedded trainer for each fire unit. It procures 615 slew-to-cue, common fire control computer, and automatic video tracker kits and 276 upgraded FLIRs and laser rangefinders to replace

obsolete components. Equipment required to standup direct support maintenance units as well as additional authorized stockage list items will be procured for Army National Guard (ARNG) units by FY02. Funding is also provided for 68 Environmental Control Units (ECUs)/Power Providing Units (PPUs) to complete fleet retrofit. Funding for additional Avengers for ARNG enhanced Separate Brigade (eSB) Air Defense Artillery (ADA) batteries and ARNG divisional battalions was sought but still remains an unfinanced requirement in PB02.

### **Joint Tactical Air Ground System (JTAGS)**

**Description.** JTAGS receives and processes direct downlinked Defense Support Program (DSP) satellite data and disseminates information to in-theater ground. It is C-130 transportable.



**Operational Requirement.** JTAGS provides theater with real-time alerting, warning, and cueing of tactical ballistic missile launches and other tactical events. This real-time data disseminated to all TMD operational elements, enables theater commanders to take immediate action to engage and destroy the threat and associated infrastructure and protect valuable assets in the projected impact area.

**Program Status.** The basic JTAGS system is fielded. Modifications are in progress to upgrade systems. Known as the Multi-Mission Mobile Processor (M3P) configuration, these upgrades will allow for compatibility with the DSP replacement, Space-Based Infrared System (SBIRS) High. With the linkage of the Army upgrade program to the Air Force SBIRS, changes in the SBIRS schedule have had an impact on the JTAGS upgrade program. While there is sufficient funding to produce the upgrades, the two-year SBIRS program slip has resulted in insufficient funds to field the JTAGS upgrades, including crew training, operational testing, and certification. Given additional funding, the First Unit Equipped (FUE) is anticipated for FY04.

### **Patriot**

**Description.** Patriot is a corps and echelon above corps (EAC) AMD system that can simultaneously engage and destroy multiple targets at varying ranges and altitudes. It is the world's only battle-proven TMD system. The upgraded



system Patriot Advanced Capability-3 (PAC-3) provides a remote launch capability; increases range, altitude, and firepower; and engages multiple maneuvering and non-maneuvering TBM and cruise missile threats. Additionally, a hit-to-kill missile is an integral part of this upgrade.

**Operational Requirement.** Patriot provides long-range, high-altitude AMD



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protection of corps and EAC ground forces and critical assets.

**Program Status.** PAC-3 ground equipment FUE was achieved in 2QFY01. FUE for the missile is on track for 4QFY01. Ground equipment upgrades include radar enhancements, below battalion communication upgrades, and the ability to remote launchers up to 30km from the radar. These Patriot modification changes will improve search, detection, track, and discrimination by the radar. Additionally, procurement of PAC-3 hit-to-kill missiles will lead to increases in range, altitude, and firepower. The PAC-3 missile Low Rate Initial Production (LRIP) I contract was awarded in 3QFY00, LRIP II in 1QFY01, and LRIP III contract is scheduled for 1QFY02. Seven consecutive successful intercepts have taken place as a part of development testing. Funding for equipment to fill out the second ARNG Patriot battalion was sought but remains an unfinanced requirement.

### **Sentinel**



**Description.** Sentinel is a trailer-mounted radar system that detects, tracks, classifies and identifies cruise missiles, UAVs, helicopters, and fixed-wing aircraft to cue SHORAD

weapons. It is employed in the division and corps area. Data is fed through the FAAD C2 to SHORAD weapons. The system is C-130 deployable.

**Operational Requirement.** Sentinel provides acquisition, tracking, classification, target location, and identification of cruise missiles, UAVs, helicopters, and fixed-wing aircraft to cue SHORAD weapons into field of view.

**Program Status.** The program is in the procurement cycle. The PB02 continues funding five systems and the enhanced target range acquisition and classification program. It does not fund a sustainment program. The FY02-07 Plan fully funds fielding to five ARNG units to complete Sentinel fielding to the force. It also funds development and procurement of enhanced target range, acquisition, and classification modifications to the Sentinel radar. The upgrades, Phase IA Range Improvements and Phase IB Target Classification Improvements, enhance target detection and classification of low observables and stealthy targets at greater ranges than currently available. Additionally, Sentinel will have a full target classification capability, continuing the Phase IB baseline capability for target airframe classification, and will support modifications required for the joint identification and target classification function to allow SHORAD weapons to operate at maximum effectiveness. Funding for additional Sentinel radars for ARNG eSB ADA batteries and ARNG divisional battalions was sought, but remains an unfinanced requirement.

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### **High Mobility Multipurpose Wheeled Vehicle-Mounted Medium-Range Air to Air Missile (HUMRAAM)**



**Description.** HUMRAMM is a heavy variant HMMWV-based launcher platform consisting of launch rails, launcher electronics, and C4 components. This system is used to store, transport, erect, direct, and launch multiple AIM-120 AMRAAMs. It buys back lost battlespace and provides an extended overwatch of Interim Brigade Combat Team (IBCT)/Interim Division (IDIV).

**Operational Requirement.** HUMRAMM provides extended range AMD against cruise missiles, UAVs, large-caliber rockets, helicopters, and fixed-wing aircraft for division and corps forces.

**Program Status.** Program is in the development cycle.

### **Medium Extended Air Defense System (MEADS)**

**Description.** Launcher is mounted on a 5-ton chassis with 10 ready missiles, provides 360-degree



coverage, is C-130 deployable, and is employed at the corps and theater levels. This system requires 60% less airlift than Patriot. Its ease of deployment and plug-and-fight versatility and tactical mobility provides protection for a mobile, maneuvering force.

**Operational Requirement.** MEADS provides low- to high-altitude air defense, theater ballistic missile defense, and cruise missile defense of the maneuvering force and fixed assets.

**Program Status.** Program is in the development cycle. The PB02 funds the completion of the risk-reduction phase and the initiation of the design and development phase. FUE is projected in 4QFY12. MEADS PB02 funding provides for the completion of the risk-reduction effort, which includes the development of prototype MEADS major end items, and the start of the design and development phase.

### **Theater High Altitude Air Defense System (THAAD)**



**Description.** THAAD is a theater-level hit-to-kill AMD system designed to negate TBMs at long range and high altitudes. Its multiple-shot capability minimizes the likelihood of damage

caused by Weapons of Mass Destruction (WMD) and falling debris. THAAD is capable of both endo- and exoatmospheric intercepts. Combined with Patriot, THAAD provides near-leakproof defense against TBMs. THAAD is C-5/C-17 deployable.

**Operational Requirement.** THAAD provides long-range, high-altitude area defense of ground forces and high-value assets against TBMs. THAAD will be part of the Objective Force with the mission to satisfy upper-tier missile defense requirements.

**Program Status.** The program is in the Engineering and Manufacturing Development (EMD) phase of development. Recent Program Budget Decision (PBD) places THAAD under Terminal Defense as part of a Ballistic Missile Defense Organization (BMDO) restructuring. PB02 funds EMD; however, based on BMDO restructuring and PBD, funding implications are being assessed. THAAD Configuration 1 FUE is scheduled for 3QFY07, and Early Operational Capability (EOC) is scheduled for 4QFY08. THAAD acceleration options, currently being assessed, can potentially move FUE by 12 months given sufficient increases in funding.

**Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS)**

**Description.** JLENS is a theater-based system using advanced sensor and networking technologies to provide wide-area surveillance and precision tracking of land attack cruise missiles. A joint program, with Army lead,

JLENS also performs as a multi-role platform to enable extended range C2 linkages. A key element of the Army Transformation single integrated air picture, JLENS integrates data from multiple sensors and C3I networks and provides correlated data to BMC4I nodes. JLENS is less expensive to buy and operate than fixed-wing aircraft and can stay aloft for up to 30 days, providing 24-hour battlespace coverage over extended areas.



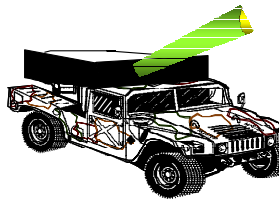
**Operational Requirement.** JLENS provides over-the-horizon surveillance and precision track for broad area defense against land attack cruise missiles.

**Program Status.** Program is in the development cycle. The PB02 funds initiation of Block I EMD. PB02 funding allows JLENS to design, develop, integrate, and demonstrate the Block I radar (fire control with sector surveillance) during program definition and risk reduction, leading to a Milestone II decision in FY05.

**Enhanced Area Air Defense (EAAD) System**

**Description.** The EAAD system is a conceptual system of plug-and-fight weapons, sensors, and C4ISR components. Still under development,

the EAAD system could emerge as a directed-energy weapon (laser or high-power microwave), a hypervelocity kinetic-energy weapon, or both. EAAD weapons protect maneuver forces and facilities (point targets), assure friendly aerial freedom of action, and provide countersurveillance and counterreconnaissance of designated areas. Also has the potential to provide defense against other threat targets, such as cruise missiles, helicopters, and fixed-wing aircraft.



**Operational Requirement.** Provides short-range defense against rockets, artillery and mortar projectiles, and reconnaissance UAV threats for theater, corps, and division forces.

**Program Status.** The program is in the development cycle.

- The EAAD Weapon Development Program initiates program definition and risk-reduction phase in FY06; EMD phase follows in the FY09-12 period.
- EAAD Target Detection Support develops and procures the requisite software to allow reconfiguring of Sentinel to perform its air defense role or the dual mode of tracking rockets and mortar rounds (supports the EAAD concept).
- EAAD System Integration initiates software development to meet emerging AMD plug-and-fight requirements.

This program is currently unfunded pending approval of requirements document.

### **National Missile Defense (NMD)**

**Description.** Acquires, tracks, discriminates, destroys, and provides kill assessments of ballistic missile-delivered warheads directed toward the United States in their mid-course phase of flight. The land-based portion of NMD is a ground-launched hit-to-kill system designed to intercept and destroy ICBMs aimed at the continental United States. The land-based system will be comprised of a launch site(s), radar sites, and command and control sites. The system will operate in conjunction with the Integrated Tactical Warning and Attack Assessment System in Cheyenne Mountain and other sensor systems such as the Defense Support Program (DSP), the SBIRS, and the Upgraded Early Warning Radars (UEWRs).

**Operational Requirement.** It protects all 50 states, infrastructure, and population at-large against a limited ballistic missile attack from states of concern and preserves the Nation's ability to mobilize and respond.

**Program Status.** The program is in the development cycle and is pending a presidential deployment decision.

### **Assessment**

The transforming AMD force will maintain pace with the Army and, in coordination and cooperation with other Joint Theater Air and Missile Defense (JTAMD) elements, provides the



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requisite Full Dimensional Protection of the Army Legacy, Interim, and Objective Forces across the spectrum of operations.

HIMAD and SHORAD systems, as we know them today, will be subsumed in this emerging AMD force. As it transforms, AMD will be in line with the Army Vision of **strategic responsiveness, deployability, agility, versatility, lethality, survivability, and sustainability.**

NMD implicitly supports Army Transformation, ensuring Army force responsiveness by protecting our ability to mobilize and project power. NMD will have the capability to engage ICBMs, potentially armed with weapons of mass destruction, at altitudes that mitigate or negate their effects. Future architectures will enhance capabilities to meet more advanced threats and at longer ranges.

While budget constraints will impact the realization of many of the AMD initiatives, AMD resources will be focused on those that are time-critical and those that provide the greatest benefits to the Army force. AMD system capabilities to meet the needs of the Legacy, Interim, and Objective Forces are presently constrained by limited quantities, technologies, or available funding. High-priority ARNG AMD units have been and will be modernized as new systems are fielded. Conversely, lower-priority ARNG AMD units cannot be modernized at this time due to current funding constraints.

## **Nuclear, Biological, and Chemical Defense**

### **Overview**

Nuclear, Biological, and Chemical (NBC) systems provide the Army with the enabling technologies of NBC defense, smoke, and obscurants to fully achieve force protection, information dominance, and Full Dimensional Protection in a WMD environment. The NBC functional area integrates doctrine, training, and equipment that allow the Army to obtain the best protection from NBC hazards for the least operational cost. The Army's NBC defense strategy is to employ "focused defense" against NBC threats so only units directly affected by the hazard would be warned to take protective measures. Using focused defense, large numbers of units will no longer assume a full protective posture as a precautionary measure. Focused defense allows units to operate in the lowest required protective posture without unacceptably increasing the risk to soldiers.

In addition to providing the means of general NBC defense common to all units, the Army provides its units increased NBC protection and substantially buttresses their ability to preserve their combat power with specialized Chemical Corps units. NBC reconnaissance units with their standoff detectors are the principal means for contamination avoidance. Combat power is restored after units are contaminated with capabilities brought to the field by decontamination units with their significantly improved capacity decontamination equipment and procedures. Biological detection

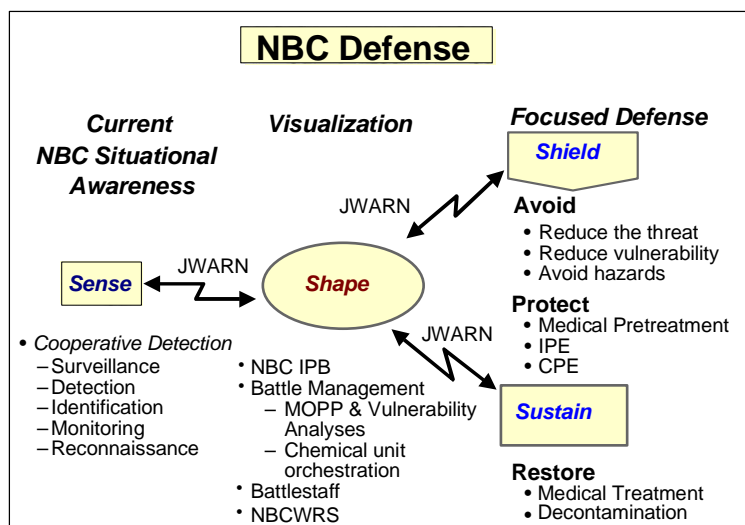


companies provide shortened response time for divisions and corps to initiate their medical response procedures to the growing threat of biological warfare agents. Information dominance is supported through development of smoke and obscurants in the visual, infrared, and millimeter ranges. Both motorized and mechanized smoke units provide this large-area smoke capability.

The NBC functional area also includes the Army's effort in addressing homeland defense against WMDs. Today, the Nation is beginning to understand that CONUS installations and power projection platforms are no longer a sanctuary. The very ability to execute our force projection strategy requires NBC-focused defense over strategic forces and means from premobilization through conflict termination.

## NBC Modernization in Support of Army Transformation

### Overview



**Chemical Vision 2010 (CV 2010)** is the implementing vision of the Army's NBC defense modernization effort. It enables the commander to minimize casualties and preserve combat power in an NBC environment and to create information superiority by using obscurants to degrade the enemy threat acquisition capability. Operationally, if the enemy has an offensive NBC capability, our primary goal is to deter threat use. If deterrence fails, our mission is to defend against an NBC attack with minimal casualties and degradation, allowing commanders to quickly restore full combat power and continue their mission across the full spectrum of operating environments.

CV 2010 describes the principles of NBC defense as sense, shape, shield, and sustain. The principles of obscuration are sense, shape, shield attack, and deceive. These principles support the patterns of operations in **Army Vision 2010** (Protect the Force and Information Dominance) and the principles in **Joint Vision 2020** (Full Dimensional Protection and Information Operations).

In providing the NBC and smoke systems for the Army's Transformation strategy, the Army will equip its specialized chemical units and provide NBC items common to all units in accordance with the three tenets of the Army's overall modernization strategy: (1) focusing its S&T efforts on the Objective Force, (2) meeting immediate operational needs in the

Interim Force, and (3) maintaining and improving the warfighting capabilities of the Legacy Force through a combination of selected modernization, recapitalization, and sustained maintenance of essential systems. The following paragraphs will elaborate on just some of the key NBC systems in the Army's modernization plans, realizing there are numerous additional NBC systems in development.

### **Contamination Avoidance**

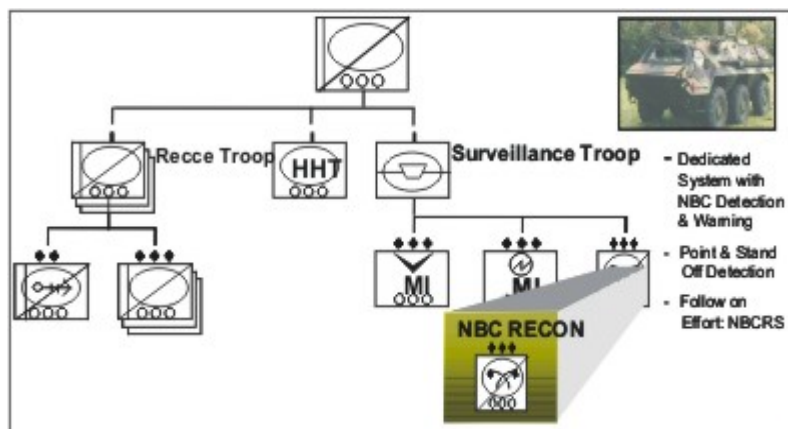


Sensing is key to avoid contamination, take protective action, and restore combat power. The goal of sensing is to develop a cooperative detection system that interfaces with current C4I networks and future Battle Management Systems. The

cooperative detection system consists of NBC surveillance, detection, identification, monitoring, and reconnaissance elements operating on the existing C4ISR architecture and feeds into the NBC Battle Management System. By 2010 and beyond, as both sensor technology and the network mature, sensors will be integrated onto all battlefield systems across all Services. These will be smart sensors that detect, identify, and warn of all NBC and Toxic Industrial Materials (TIMs) threats and can be rapidly programmed for new threats as they are developed and used by the adversary.

### **Converging Reconnaissance Requirements**

There will be a converging of NBC reconnaissance from separate systems such as the NBC Reconnaissance System (M93 series, commonly called Fox), the biological surveillance (M31 series Biological Integrated Detection System (BIDS)), and the Light Nuclear Biological Chemical Reconnaissance System (LNBCRS), into a single platform for the Objective Force based on the Interim Armored Vehicle-NBC Reconnaissance System (IAV-NBCRS). Current developments, such as the Joint Biological Point Detection System (JBPDS), the Chemical Biological Mass Spectrometer (CBMS), the Short Range Biological Standoff Detection System (SRBSDS), and NBC sensing packages for Unmanned Ground Vehicles and Unmanned



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Aerial Vehicles will contribute key capabilities to meeting the needs of the Objective Force.

In accordance with the Army's Transformation Strategy for the Interim Force's IBCT, the IAV-NBCRS will be based on Force XXI IBCT operational requirements. The IAV-NBCRS will have surveillance, detection, identification, monitoring, and reconnaissance capabilities. The IAV-NBCRS will also meet lethality, tempo, survivability, and sustainability requirements. The IAV-NBCRS will contain radiation, point biological and chemical, and standoff chemical detection systems in one platform, as well as leverage UAV assets within the IBCT for Aerial NBC Reconnaissance. IAV-NBCRS will be organized into a three-vehicle platoon organic to the Reconnaissance Surveillance Target Acquisition (RSTA) squadron of the IBCT.

### **Protection**



Protecting the force from NBC hazards is critical to the success of the Army in any battlespace, with the goal of providing Army units the ability to fight and win in a contaminated battlespace. Recent and near-term individual protection developments are producing lightweight, durable protective clothing and masks that are compatible with existing and near-term weapons systems. These new technologies allow for a much lighter burden on the logistics system by increasing the wear life of the suits by 50% (from 30 to 45 days) thus

substantially decreasing the demand for sustainment stocks. The Army will begin replacing its current M40 series of protective masks beginning in FY05 with the next generation mask, the XM 50 Joint Service General Purpose Mask (JSGPM). At the same time, the Army will have completed its transition from its current Battle Dress Overgarment (BDO) to the new Joint Service Lightweight Suit Technology (JSLIST) suits, and move to an NBC-Soldier Hydration System for improved capability under NBC conditions. Collective protection will improve for medical units with the fielding of the Chemically Protected Deployable Medical System (CPDEPMEDS) and the Chemical Biological Protective Shelter (CBPS) at the battalion level. Collective protection for the IAV will consist of a ventilated facepiece system.

### **Decontamination**

The ability of U.S. forces to conduct decontamination is an essential component of force protection. Having the capability to remove, neutralize, or destroy NBC contamination is a key component in restoring the combat power of units.



Lessons learned from the past show that current decontamination methods and capabilities are inadequate to keep pace with Transformation.

Units must be able to decontaminate faster, more effectively, with minimum amounts of water and without

damaging sensitive equipment while sustaining operations. Developing decontaminants, delivery apparatus, and doctrine is an ongoing effort that will help to ensure survivability in contaminated environments.

The future decontamination system concept will be capable of conducting thorough, mobile, fixed site and terrain decontamination operations with the same equipment. Using the HEMTT-Load Handling System (LHS) and decontaminant provides for a common platform with a reduced logistical footprint while facilitating critical NBC decontamination operations in complex and restrictive terrain.

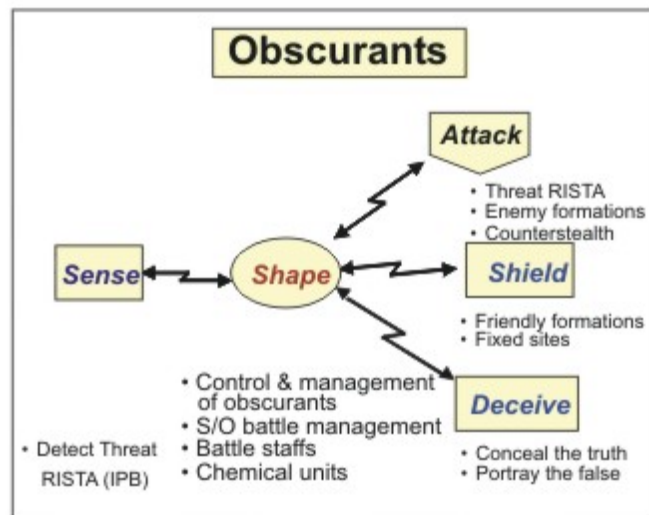
For the Legacy Force, existing M17 Lightweight Decontamination Systems (LDS) will be maintained to conduct operational decontamination. Chemical Corps dual-purpose (smoke and decontamination) units will be equipped with the Modular Decontamination System (MDS). The Objective Force will be equipped with the new decontaminants and applicators that ultimately are selected from the Joint Sensitive Equipment Decontamination (JSSED) program and the Joint Fixed Site Decontamination (JSFXD) program.

### **Obscuration**

With the rapid proliferation of advanced target acquisition systems and advanced weapons, the commander must not only protect his situational awareness, but also degrade the adversary's capability. The five

principles for obscurants provide the framework to degrade an adversary's situational awareness. Obscurants support the warfighter by providing him with a capability to attack an enemy's target acquisition systems across the electromagnetic spectrum.

Smoke systems for the Legacy Force, providing visual and infrared (IR) smokes only, will remain with the current M56 motorized smoke system (HMMWV mounted). A Millimeter Wave (MMW) capability is programmed for the M56 in both the Legacy and Objective Forces. For the mechanized units of the Legacy Force, the current M58 (M113A3-mounted) smoke system will be maintained but is not funded to provide an MMW capability. The addition of the MMW



capability for the M58 is an unfunded requirement to support both the Legacy and Objective Forces. Obscurants for the Interim Force IAV will consist of a rapid multispectral, self-obscuration grenade system.



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### **Unmanned Ground Vehicle Rapid Obscuration Platform (UGVROP)**

Military operations in urban terrain present key survivability and C2 challenges to deployed forces, due in part to the relatively close quarters and quick reaction times associated with high-intensity urban combat. Recent developments in both robotics and obscurants provide new opportunities to increase the survivability of all Army forces.



#### **Discussion of equipment**

### **M93/M93A1 Nuclear Biological Chemical Reconnaissance System (NBCRS) (Fox)**

**Description.** NBCRS–Fox Block I Modification (M93A1) contains an enhanced NBC sensor suite consisting of the M21 Remote Sensing Chemical Agent Alarm (RSCAAL), MM1 Mobile Mass Spectrometer, Chemical Agent Monitor and Improved Chemical Agent Monitor (CAM/ICAM), AN/VDR-2 Beta Radiac, and M22 Automatic Chemical Agent Detector and Alarm (ACADA). The NBC sensor suite has been digitally linked with the communications and navigation



subsystems by a dual-purpose central processor system known as the Multipurpose Integrated Chemical Agent Detector (MICAD). The MICAD processor fully automates NBC warning and reporting functions and provides the crew commander with full situational awareness of the Fox's NBC sensors, navigation, and communications systems. The M93A1 Fox is also equipped with an advanced navigation system Global Positioning System (GPS) and Autonomous Navigation System (ANAV) that enables the system to accurately locate and report agent contamination. The mobility platform is a six-wheeled, all-wheel-drive armored vehicle capable of cross-country operation at speeds up to 65mph. The Fox system is fully amphibious with swimming speeds up to six mph. As a reconnaissance vehicle, it can locate, identify, and mark chemical/biological agents on the battlefield. The Fox usually accompanies scouts or motorized reconnaissance forces when performing its NBC mission. It has an overpressure filtration system that permits the crew to operate the system in a shirtsleeve environment, fully protected from the effects of NBC agents and contamination. The M93A1 system is operated by a three-person crew (legacy systems require a four-person crew). The M93A1 will be one of the few systems fielded with a fully interactive electronic technical manual (IETM).

#### **Operational**

**Requirement.** Detect, identify, and mark areas of nuclear and chemical contamination; sample for NBC contamination; and report



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accurate information to supported commanders in real time.

**Program Status.** 1QFY99 FUE. 1QFY00 fielding of 54 systems has been completed. Remaining 42 systems are scheduled for conversion and fielding through 4QFY03. General Dynamics (Detroit, Michigan and Anniston, Alabama) and Henschel Wehrtechnik (Kassel, Germany) are the developer and manufacturer.

**M31/M31A1 Biological Integrated Detection System (BIDS)**



**Description.** The BIDS consists of a shelter mounted on a dedicated vehicle (M1097A1 HMMWV) and equipped with a biological detection suite employing complementary technologies to detect large-area biological attacks. It can detect all types of Biological Warfare (BW) agents in less than 10 minutes, and identify any 8 agents simultaneously in less than 30 minutes.

**Operational Requirement.** The BIDS prevents operational-level surprise and mitigates the effects of large-area biological attacks during all phases of a campaign. Individual BIDS systems are employed throughout the corps area to create a sensor array/network. The BIDS network is used for warning and confirming that a BW attack has

occurred and will provide a presumptive identification of the BW agent being used.

**Program Status.** The Nondevelopmental Item (NDI) version of the BIDS has been fielded to the 310th Chemical Company (Reserve) and the P3I version has been fielded to the 7th Chemical Company (Bio). Each company has 35 systems. Environmental Technologies Group, Bruker, Inc., BioRad, Inc., Harris Inc., and Marion Composites are the developers/manufacturers.

**M17 Lightweight Decontamination System (LDS)**

**Description.** The M17 system includes a pumper and heater module, an accessory box, and a 3,000-gallon rubberized fabric, collapsible water tank. Rock Island Arsenal is the developer/manufacturer.



**Operational Requirement.** The M17 is used for operational equipment decontamination at the battalion level.

**Program Status.** Fielding completed.

**M58 Tracked Smoke System (Wolf)**

**Description.** The M58 Wolf is a mechanized armored vehicle, which provides large-area multispectral screening for maneuver forces. Major

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components include a turbine smoke generating system. The M58 uses a M113A3 chassis. The M58 carries enough fuel and obscurant material to continuously produce visual smoke for up to 90 minutes and 30 minutes of infrared screening smoke. The Wolf is a program to add a 30-minute millimeter wave obscuring capability to defeat enemy radar devices and



weapon systems. The M58 is operated by a three-person crew and has the capability to counter the threat arising from the wide proliferation of advanced visual and IR sensors.

**Operational Requirement.** The M58 Wolf enhances the maneuver commander's ability to tactically employ his forces. Missions include providing static and mobile visual and/or IR screening (haze, blanket, curtain) to conceal ground maneuver forces, breaching, recovery, and river crossing operations.

**Program Status.** 133 of 140 systems fielded. Last seven systems scheduled for fielding in 4QFY01. Anniston Army Depot is the developer/manufacturer.

#### **Modular Decontamination System (MDS)**

**Description.** The MDS consists of two modules and associated accessories: one M21 Decontaminant Pumper (DP)

and two M22 High-Pressure Washers (HPWs). The M21 DP provides the capability to apply decontaminants. The M22 provides the capability of dispensing water at pressures OF 500



to 3000 psi to remove mud, dirt, grease, or other contaminants from equipment exteriors.

**Operational Requirement.** The primary mission of MDS-equipped units is to conduct thorough equipment decontamination operations. The MDS replaces the M12A1 PDDA's present labor-intensive process and allows better decontamination by providing high-pressure and hot water capabilities with controlled dispensing of decontaminants.

**Program Status.** FUE is 2QFY02. The CENTECH Group is the developer /manufacturer.

#### **M56 Wheeled Smoke System (Coyote)**



**Description.** The M56 Coyote is a motorized system mounted in an M1113 expanded capacity HMMWV.

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The smoke generating system provides 90 minutes of visual and 30 minutes of infrared obscuration before resupply is needed. A preplanned materiel change to add a 30-minute millimeter wave obscuring capability will defeat enemy radar sensors. A crew of two operates the M56 Coyote. M56 is currently the base platform for UGVROP conceptual studies in support of Army Transformation.

**Operational Requirement.** The M56 Coyote enhances the division or corps commander's ability to protect his own forces by denying the enemy information. The M56 operates in support of light and airborne maneuver units by disseminating obscurants on the move and from stationary positions to defeat enemy sensors and smart munitions such as tank thermal sights, guided munitions, and other systems operating in the visual through far-IR regions of the electromagnetic spectrum.

**Program Status.** FUE was 1QFY99 at Fort Bragg. In 4QFY99, finished fielding 25% of the Army's required M56 Smoke Generator Systems. General Dynamics Robotic Systems is the developer/manufacturer for FY95-00 production with the developer/manufacturer for FY01-05 still to be determined.

#### **Interim Armored Vehicle(IAV)-NBCRS**

**Description.** The IAV-NBCRS will incorporate the Block II NBCRS integrated chemical and biological point detectors that will allow on-the-move standoff biological and chemical agent detection. The Chemical

Biological Mass Spectrometer (CBMS) Block II will improve the detection and identification of liquid chemical agents while providing a first-time biological agent detection capability to the reconnaissance platform. The Block II sensor suite will automatically integrate contamination information with data from onboard navigation and meteorological systems and rapidly transmit contamination hazard and clear area intelligence to the appropriate operations center. Integration of the common NBC technical architecture will allow for expansion/upgrading of the onboard computers at minimal cost, as well as the command and control of NBC-sensing UAVs and Unmanned Ground Vehicles (UAGs) in the Objective Force system.



**Operational Requirement.** The IAV-NBCRS must be capable of detecting and identifying NBC contamination and toxic industrial and residual hazards.

**Program Status.** The IAV-NBCRS development program completed the Critical Design Review (CDR) for the NBC sensor suite in September 2000. Hardware procurement and software coding has been initiated. A demonstration of the NBC sensor suite is scheduled for April 2001. Engineering Development Test (EDT) and Limited User Test (LUT) are planned for FY02. Milestone C is scheduled for 1QFY03 and will allow

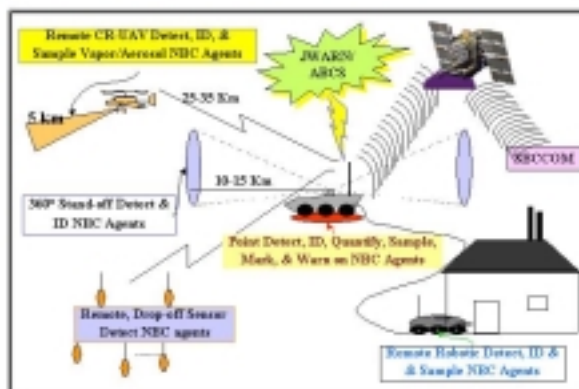
the start of LRIP. Production Verification Testing (PVT) and Initial Operational Test and Evaluation (IOT&E) are planned for FY03/04. Developer and manufacturer are still to be determined.

### **Objective Force System**

**Description.** The future objective system will be based on the IAV-NBCRS as baseline, and will include fully integrated point and standoff chemical and biological NBC sensors, increased armor protection, and preplanned product improvements of NBC sensing UAVs and UAGs. Will provide U.S. Army chemical forces a superior capability and a bridge to the future. Open architecture design facilitates Future Combat System capabilities integration.

**Operational Requirement.** Remote standoff ranging detection identification.

**Program Status.** In concept development.



### **Assessment**

Among the significant changes to the future strategic environment,

proliferation of WMD is recognized as a principal asymmetric threat capable of providing an adversary military advantage to neutralize overwhelming conventional superiority. Having an effective NBC defense is a necessary component of any defense strategy that seeks to demonstrate to the adversary that use of WMD will not gain the advantage sought. Modernizing the force while conducting a robust S&T effort is critical to preventing technological surprise from new Chemical/Biological (CB) agents or different employment means. Recapitalizing and maintaining the current force is necessary to enable Transformation and mitigates risk by extending the useful life of current systems within fiscal constraints. This modernization plan assures a disciplined approach to meeting mission-based requirements and secures orderly change as we transition to the Objective Force.

Nevertheless, although significant and measurable progress has been made to enhance survivability and sustain operations after an NBC attack, current fiscal constraints have inhibited our ability to establish and maintain information superiority by countering an adversary's reconnaissance, surveillance, and target acquisition sensors. Unless additional resources are provided, we will not be able to take full advantage of our ability to obscure battlefield sensors operating in the millimeter wave region of the electromagnetic spectrum. This capability must be included in both the Legacy and Objective Forces as we transform from platform survivability to force survivability.



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## **Engineer Survivability Component**

### **Overview**

In the challenging and complex environment of the 21<sup>st</sup> century, The Army will continue to place emphasis on the ability to protect and provide freedom of action and movement of personnel and assets through the tailored selection and application of multilayered active and passive measures. Engineer assets provide key enablers to accomplish this task. The Engineers seek to capitalize on the insertion of technologies that enhance the survivability of the force. Key systems such as High Mobility Engineer Excavator (HMEE) and the Tactical Fire Fighting System (TFFS) provide a capability to protect the force. The Ultra-Lightweight Camouflage Net System (ULCANS) provides all forces with a lightweight camouflage system for increased passive protection.

### **Engineer Modernization in Support of Transformation**

#### **Overview**

Engineers play a vital role in the Legacy, Interim, and Objective Forces. The primary role of Engineers on the modern battlefield is to provide mobility, countermobility, survivability, general engineering, and geospatial engineering. This role does not change in the Interim and Objective Forces. The ultimate goal of Engineer modernization is to support the maneuver commander. As the Army transitions to new doctrine, equipment and organization, the Engineer Corps will continue and expand modernization initiatives already underway to transform in stride with the rest of the Army.

### **Legacy, Interim, and Objective Forces**

In the Legacy, Interim and Objective Forces, the three systems in this section support all three forces in the same manner. Full Dimensional Protection will be enhanced with the introduction of the High Mobility Engineer Excavator (HMEE), which increases survivability by construction of survivability positions and protective berms. The HMME will replace the Small Emplacement Excavator (SEE) in the Legacy and Interim Forces and will remain a key system for the Objective Force. The Tactical Firefighting Systems (TFFS) provides a reactive and mobile firefighting capability to all areas on the battlefield for all three forces. The Ultra-Lightweight Camouflage Net (ULCANS) provides significantly increased passive protection over current camouflage systems for all three forces.



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## Discussion of Equipment

### High Mobility Engineer Excavator (HMEE)

#### **Description.**

The HMEE is a lightweight, all-wheel drive, diesel engine driven, high-mobility vehicle with backhoe, bucket loader, and other attachments such as a handheld hydraulic rock drill, chain saw, and pavement breaker. A multipurpose front bucket supports general lifting and loading operations. A backhoe bucket is used for trenching, ditching, and digging missions. Available attachments include a forklift, auger with the capability to bore to an 8-foot depth, a winch, snowplow, and armor protection if needed. The HMEE is highly mobile and has a speed of 40 mph on improved roads. Planned fielding includes Active, Reserve, and ARNG Components.



**Operational Requirement.** The IBCT requires a rapidly deployable construction equipment capability for survivability and construction purposes. By being highly mobile the HMEE performs both missions without the need of a truck/trailer combination to move it from job site to job site.

**Program Status.** The Operational Requirements Document (ORD) for the HMEE has been approved. The HMEE has been approved for a Foreign Comparative Test (FCT) in FY01. Fielding could begin in FY02 based on the results of the FCT. PB FY02 will fund 136 systems.

### Tactical Firefighting System (TFFS)

**Description.** The TFFS will consist of an all-purpose crash rescue/firefighting truck referred to as a Tactical Firefighting Truck (TFFT), a Load Handling System (LHS) vehicle mounting an Engineer water mission module which will have a capacity of 3,000 gallons of water, and a Palletized Load System (PLS) trailer with another 2,000-gallon water module. The major efforts involve the TFFT, which will be a commercial firefighting unit mated to a standard Army HEMTT vehicle. This vehicle is as mobile and maintainable as the force supported and overcomes many of the problems associated with using standard firefighting equipment in a tactical environment. Planned fielding includes Active, Reserve, and ARNG Components.

**Operational Requirement.** The TFFS will provide a total of 5,000 gallons of water and a modern foam system manned and equipped to fight all the various fires expected on the battlefield. Primary focus is to reach the tactical site, rescue victims, and prevent further loss of material, facilities, or lives. In the field, the TFFS will be stationed at a temporary tactical airfield, ammunition storage site, or petroleum storage site or collocated with a division or corps headquarters.

**Program Status.** A contract was awarded in 4QFY00. FUE is set for 1QFY04. PB02 will fund 102 systems.

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### **Ultra-Lightweight Camouflage Net System (ULCANS)**

**Description.** ULCANS is an all-weather, modular concealment system providing visual, near-IR, and radar signature reduction. The system is designed for easy, rapid deployment and recovery and is field repairable and maintainable. The system will be provided in woodland, desert, arctic, and urban patterns. The system provides forces the ability to reduce probability of detection while conducting combat operations. ULCANS will provide this capability for weapons systems, vehicles, tactical operation centers, aircraft, logistics systems, and other tactical equipment.



**Operational Requirement.** ULCANS will significantly improve the capability, weight, and safety factors of the existing camouflage nets. Primary goal is to make equipment and personnel nearly invisible to radar, IR, and visual detection, thus increasing the survival rate.

**Program Status.** Funding runs through FY01.

### **Assessment**

Force Protection is a vital part of the Objective Force, and Engineer survivability efforts are essential to achieving a protection overmatch to threat. Of particular importance is increased funding for the ULCANS camouflage net system. Funding runs through FY01 but is insufficient to provide this improved system to all units. Failure to field the ULCANS leaves our forces vulnerable to detection from commercially available sensors. Firefighting is essential for airfield operations, munitions storage, and base camp protection. Current systems are aged and unable to provide the necessary mobility to support our Legacy, Interim, and Objective Forces. HMEE is essential to provide protective positions, sanitation facilities, and rubble reduction to the Interim and Objective Forces.

### **Military Police Component**

#### **Overview**

The Military Police functional area provides critical linkages between maneuver and sustainment forces to ensure freedom of movement and protection of sustainment and C2 nodes. While primarily represented within the Full Dimensional Protection area, Military Police also provide significant enablers to the overall success of Dominant Maneuver and Information Superiority. It is imperative that the Military Police transforms and takes advantage of initiatives that enhance Military Police and the Army as a whole. Military Police doctrine remains relevant throughout the Army's

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Transformation based on five primary Military Police functions: maneuver and mobility support; area security; internment, resettlement, and enemy prisoners of war operations; police intelligence; and law and order operations. This diverse mission set provides a significant advantage to Army forces by minimizing the diversion of valuable combat forces to perform missions not requiring combat formations.

The versatility of the Military Police forces requires that they be survivable and possess the necessary lethality to deal with the asymmetrical threats, which are becoming even more critical concerns in the changing strategic and operational environment. Unique capabilities include the following: understanding the complexity of ensuring maneuver and mobility support in noncontiguous operations characterized by uncertain host nation support; understanding that multiethnic and demographically diverse populations will require special handling; maximizing the utility of police intelligence, which has always been embedded in law enforcement, but has taken on increased importance as a source of intelligence in support and stability operations such as those in Bosnia and Kosovo; and day-to-day law and order and interface between military forces and the civilian populace.

Finally, area security remains a constant requirement throughout the transition of the force, with force protection and physical security an enduring priority. Overall, the daily execution of basic Military Police tasks, which contribute significantly to

controlling the human dimension in diverse and challenging contingencies, coupled with training for dealing with less conventional threats, demonstrates the important contribution that the Military Police will make in providing Full Dimensional Protection to the transforming force.

## **Assessment**

As U.S. combat and combat support forces have all improved their survivability, lethality, mobility, and communications capabilities over the last few years, and with the increased likelihood of asymmetric threats to the force, the thresholds for threat levels are currently being redefined. Ongoing equipment initiatives include: leveraging Defense Advanced Research Projects Agency (DARPA) digital Military Police initiatives for continued integration with the maneuver Land Warrior program to provide much needed relevant and functionally unique, yet integrated, information requirements at the soldier level; enhanced day/night thermal optics; integration of dynamic sensors (seismic, acoustic, video) for enhanced reconnaissance and security operations and other physical security/force protection capabilities; continued robotics exploration and possible integration into the force capabilities; and work on nonlethal capabilities for the Army and DoD in conjunction with joint nonlethal programs to provide conflict resolution alternatives to tactical commanders. These initiatives will ensure that the Military Police functional area remains relevant and fully supportive of the Army throughout Transformation

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## ANNEX C: PRECISION ENGAGEMENT

### General

**Precision Engagement** is the ability of joint forces to locate, discern, and track objectives or targets; select, organize, and use the correct systems to engage or attack; generate desired effects; assess results; and reengage with decisive speed and overwhelming effect, as required, throughout the full range of military operations.

Precision Engagement is effects-based engagement that is relevant to all types of operations. Its success depends on in-depth analysis to identify and locate critical nodes and targets. The pivotal characteristics of Precision Engagement are the linking of sensors, delivery systems, and effects.

Fire Support units, along with Army aviation attack units (covered separately in Annex A, Dominant Maneuver), will remain the Army's premier instruments of force for Precision Engagement. As the Army transforms into a more deployable, lethal, and sustainable force, the systems will increase in lethality yet experience a decrease in logistical support required. The Fire Support structure will migrate from the current heavy artillery force to a highly mobile

force using common smart munitions with greater lethality. The aviation community will transform from proven systems such as the Kiowa/Apache teams of Desert Storm to new systems like the Apache Longbow and the Comanche.

The Army will modernize within a constrained resource environment to meet the needs of Transformation. The Legacy Force will rely on proven systems such as Paladin, the Multiple Launch Rocket System (MLRS), Apache, and Kiowa Warrior, as well as see the introduction of a few selected acquisitions, such as Crusader. The Interim Force will rely on proven technology with some new equipment. The Objective Force will see a complete transformation of the Army's Precision Engagement capability. This force will consist of a Future Combat Systems (FCS) variant designed as a Fire Support platform that delivers highly lethal common munitions in support of the maneuver commander.

This annex provides specific information on surface-based fire support involved in support of the Precision Engagement operational concept.

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## Fire Support

### Overview

When engaged in violence to reach ends, armies pursue their objectives through fires and maneuver. The two are inextricably linked. Maneuver is the effort to achieve a position that inherently affords an advantage over an enemy. Fires are the effects of lethal and nonlethal weapons. When closely coordinated, fires and maneuver yield rapid and decisive results on the battlefield. Fire Support is fires that must be closely coordinated with the actions of ground maneuver forces. Fire Support lays at the critical juncture between fires and maneuver and is thus the key to our maintaining the finest ground fighting force in the world. Fire Support is succinctly defined as “fires that directly support land, maritime, amphibious, and special operation forces to engage enemy forces, combat formations, and facilities in pursuit of tactical and operational objectives.”

-- Joint Pub 3-09

As the Army moves forward through Transformation toward the Objective Force, the Fire Support (field artillery) community will continue to evolve in order to support the force as a whole. Fire Support developments will be based on the cornerstones of soldiers and organizations, enabled by equipment. Future operational concepts dictate that the Army will fight as maneuver and maneuver support “units of action,” packaged or tailored for specific objectives. To meet the requirements and operational constructs of the Objective Force, integrated maneuver and fires must continue to evolve in conjunction with one another. When closely coordinated, maneuver and fires have the ability to deliver precise, discriminatory effects with overmatching speed, range, and lethality. Fire Support provides the critical linkages between fires (lethal and nonlethal) and maneuver and is, therefore, an essential element in maintaining the finest ground fighting force in the world.

Fires are developed as an execution-oriented force that fully leverages battlefield information and situational awareness, which allows ground forces to shape the “deep battle” while assuring victory in the “close fight.” As the Army looks to conduct operations in the future, Fire Support will continue to have dramatic impact throughout the entire battlefield. In the deep fight, operational or shaping fires will be essential in setting conditions for decisive operations. We must isolate the close fight and protect the force while shaping the next fight. In the close fight, maneuver forces will be employed to destroy enemy forces. Fires will allow us to fix and suppress the enemy and thus enable freedom of maneuver. Fires also allow the commander to deliver unique effects that, in turn, complement and reinforce maneuver systems. Capabilities must continue to be developed which will allow us to conduct simultaneous strikes throughout the area of operations.



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It is imperative that future Fire Support warfighting Operational and Organizational (O&O) concepts be nested in the Army Vision. To properly align Fire Support systems with Army Transformation, the following imperatives are essential:

- Fires must operate within a joint and combined “system of systems.”
- Fires must have the same strategic deployability and tactical mobility as maneuver.
- Fires must maximize commonality of organizations and equipment.
- Fires must capitalize on munitions lethality to reduce our logistics footprint.
- Fires are dependent on the Army National Guard (ARNG) to provide required combat power.
- Fires must fully leverage information technologies to be relevant.

Challenges abound in developing fires capable of meeting the requirements above. These include:

- Most of our current and emerging capabilities were created to offset the Soviet threat on European terrain. Desert Storm requirements were similar. Future capabilities must be adapted to new requirements.
- Effects were largely dependent on massed fires and area targets. This is not likely to be the case in future requirements.
- There will be a continuing need to engage fleeting targets.

- Many of our current target acquisition assets are not discriminatory in depicting paramilitary and unconventional forces. This is likely to be a future need.
- Fusion of intelligence for targeting is starting to emerge but, in many cases, lacks the real-time speed.
- Many countries have overmatch capabilities in quantity or range for precision strike capability.
- Proliferation of threat forces that can utilize sanctuary positions in conjunction with the protection of urban and complex environments is keyed to the perception of the U.S. aversion of unrestricted collateral damage.

These challenges will generate and necessitate changes of varying degrees that affect Doctrine, Training, Leader Development, Organization, Materiel, and Soldier Systems (DTLOMS). As the Army continues to evolve to meet future requirements, Fire Support must and will continue to evolve as well.

## **Fire Support Modernization in Support of Transformation**

### **Overview**

Fire Support modernization in support of Transformation must consider all aspects of modernization as they apply to the Army Legacy, Interim, and Objective Forces. Legacy Forces must continue to evolve to ensure warfighting capabilities are maintained at all times, allowing us to respond where and when needed. Legacy

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systems must remain operationally relevant until formerly retired. Interim and Objective Forces must be developed which not only leverage current and future materiel advances but also those advances generated throughout the entire DTLOMS spectrum. We must begin immediately to develop a force that is fully supports the Army Vision—a force that is **responsive, deployable, agile, versatile, lethal, survivable, sustainable, and dominant.**

To properly develop the requirements of future fires, we must develop a cohesive, comprehensive vision for field artillery. To this end, a number of axes of change have been formulated which continue to evolve. These include the concepts of future tactical fires and effects, unmanned operational reach, munitions centrality, effects-based fires, organizational transformation, and dynamic force tailoring.

Integration of these efforts will provide real-time visibility over all relevant sensors and delivery systems for more responsive and flexible distribution of effects. The need to engage fleeting targets at greater ranges with increased target discrimination is imperative. Fusion of all relevant sensors will generate a vast array of targets; therefore, a dynamic architecture capable of filtering out High Payoff Targets (HPTs) is essential.

A network centric process will be utilized that, when combined with mission tailored units of action employing multiple platform capabilities, will allow us to dynamically

deploy combat power as needed. An embedded decision support structure that will automatically identify and apply Rules of Engagement (ROE) and collateral damage constraints is required. A fused combat assessment will allow us to not only apply complex terrain and urban strike considerations but also provide us with the capability to redirect strikes as needed and then conduct post strike assessments in the target area.

Munitions centrality will shift the burden of terminal effects more to munitions than platforms as it aims to be the primary driver of range and accuracy. Lethality must be increased whereby the concept of “one round, one hit, one kill” becomes a reality. Loitering munitions, rapidly transportable on different carriers (platform independent) and with the potential to offer unmanned fire capability, are essential. However, for munitions to reach maximum effectiveness, delivery platforms must be optimized. Thus, robotic ammunition handling, self-location (i.e., Position Navigator (POSNAV)), technical fire direction, muzzle velocity management and meteorological measurement systems must be inherent on all delivery systems.

One area of immediate concern is the time required to place effects on a designated target. The time required to process a fire mission may be excessive if an effective digital link is not established. Soldiers and units may opt to use voice means and not utilize organic equipment provided. Digital connectivity allows for improved target location, situational awareness,

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and the employment of effective sensor-to-sensor strategies.

Another area of concern is the changing nature of effects coordination as it relates to nonlethal information operations (IO). Recent events have strengthened the thought that, as environmental complexity rises, nonlethal IO becomes more important. Present operations allow us to recognize that nonlethal/lethal integration is an extremely bifurcated process. Joint exercises and operations in Kosovo and Bosnia indicate the dramatic need for a targeting-like process. Today, the Fire Support Coordinator (FSCOORD) is routinely tasked with this integration. Senior, experienced leadership must be trained and an enhanced, formal network must be established.

Future non-line-of-sight (NLOS) capabilities must be developed that perform roles currently accomplished by medium artillery and mortars. It is imperative that we avoid another generation gap with maneuver systems. A capability for near shoot-on-the-move fires is important. A precision munitions suite with a 40-50km range must accompany this capability.

In concert with NLOS development, we must leverage FCS technology development while raising the level of MLRS capabilities; thus, the need for High Mobility Artillery Rocket System (HIMARS) evolution. HIMARS is an Objective Force system but maintains a need to exploit increased capabilities for unmanned operational reach at extended ranges.

Challenges abound, but solutions can and must be developed. Increased system strategic deployability and tactical mobility equal to the supported force will allow us to get to the fight. Optimized delivery systems, munitions, and organizations will provide immediate responsiveness while allowing higher echelons to monitor or influence the current fight. Effects coordination and generation will allow field artillery to fulfill its inherent mission—"to provide responsive fires and to integrate and synchronize the effects of fires, both lethal and nonlethal, to achieve the supported commander's intent."

## Systems

**Legacy Force.** Near-term modernization actions consist of both equipment modernization and force structure changes necessary to achieve the maximum capability within the allocated budget. Equipment modernization strives to make incremental changes to existing systems, embedding situational awareness and maintaining digitization momentum while extending their service life and maintaining overmatch until they can be replaced. Fielding of Crusader to the Counterattack Corps and subsequently cascading M109A6 Paladins to displace older M109 series howitzers in ARNG division artilleries is paramount. Upgrading of Firefinder radar, fielding of Advanced Field Artillery Tactical Data System (AFATDS) (see Annex E, Information Superiority, for details), and the start of an upgrade to the MLRS/HIMARS system to enable it to fire the new suite of munitions are key to this effort. Force structure changes address

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critical shortfalls in warfighting capability. During this period, MLRS and M198 units will reorganize. These force structure changes, together with modernization efforts, will meet the critical near-term needs of field artillery.

To shape the battlespace and conduct decisive operations, field artillery will move towards munitions centrality. Rockets and missiles will be developed and procured that extend their range and lethality and provide the corps commander with a true organic, deep-strike capability. The Army will also begin production of smart and brilliant munitions, greatly increasing lethality against selected high-value targets while decreasing logistical and ammunition requirements.

**Interim Force.** In the midterm, field artillery will complete development and begin to field systems required to fully support the Army as we transition to the Objective Force. We will begin procurement of some of the next generation of systems in support of both light and heavy forces. Key among these are the lightweight 155mm (LW155) howitzer, the HIMARS, and the AN/TPQ-47 Firefinder Radar System. LW155 and HIMARS will replace all M198 howitzers in the Army and provide a mobile, deployable, deep-strike capability for early entry operations. LW155 will also be fielded to the Interim Brigade Combat Team (IBCTs) beginning in FY05. Until then, M198s will provide cannon support to these highly mobile forces. HIMARS, while not organic to the IBCTs, will also be available to provide deep fires as needed. Munitions centrality will

continue with a suite of long-range precision strike weapons that compensate for a smaller force and a Firefinder AN/TPQ 47 radar capable of targeting at operational depths. Profiler, the next generation meteorological system, will be fielded to the entire force and will provide for target area meteorological information critical to accurate fires.

**Objective Force.** In the far term, modernization will achieve field artillery's goals and position field artillery to meet the requirements of the Objective Force. Munitions S&T should provide for the ability to procure smaller, lighter, more mobile weapons platforms capable of effective fire support throughout the battlefield. There are a number of FCS designs currently being considered by the Army, and no decision is expected for several years. However, it is envisioned that the indirect fire platform will replace both 105mm and 155mm systems throughout the Army. HIMARS Pre-Planned Product Improvement (P3I) will provide a lightweight, deployable weapons platform to support the Objective Force division and echelons above division commanders. This platform will be developed to support specific munitions rather than vice versa. Technological advances will be applied to target accuracy, artillery acquisition, and area meteorology systems in support of the Objective Force. Advances in composite materials and ballistic protection technology will be retrofitted to existing systems to reduce weight and increase deployability.

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## Discussion of Equipment

### Crusader



**Description.** Crusader is field artillery's highest priority combat system and a technology carrier for future Department of Defense (DoD) systems. Crusader is a fully digital, networked, fire support system consisting of a self-propelled, 155mm howitzer and its dedicated resupply vehicle. This system provides significant increases in range, accuracy, rate of fire, lethality, mobility, and survivability over the current M109 series fleet.

**Operational Requirement.** Crusader will be the indirect fire support system providing fires in support of mechanized maneuver forces on the future battlefield. It provides a critical augmentation option for Interim Force artillery. Crusader enables the United States to regain indirect fire dominance by providing significant increases in range, mobility, and responsiveness, thus releasing maneuver forces from their current supporting artillery limitations. Crusader will be the keystone fire support system of Army XXI, *Joint Vision 2020*, and an integral component of the future Army. Crusader provides a strategically

mobile, cost-effective program, providing full spectrum fire support for maneuver forces. Crusader will increase the overall combat effectiveness of the total force by up to 53%, while reducing the logistics burden 15-25%. Crusader provides three times the operational capability of current systems with the same strategic lift. Crusader will revolutionize the future battlefield, providing unmatched rate of fire, responsiveness, and accuracy. Crusader restores U.S. Army fire support dominance.

**Program Status.** Crusader is on track to begin fielding in FY08. Milestone II is presently scheduled for 2QFY03. The FY02 President's Budget (PB02) allows the program to continue in a fully funded posture as we move forward to procure 480 systems.

### Multiple Launch Rocket System (MLRS)

**Description.** The MLRS M270A1 launcher supports Army Transformation by providing the Counterattack Force with zero-miles recapitalization and operational upgrade to the M270 launcher. The M270A1 program will provide the launcher with 10-15 years of additional life. The upgrades correct deficiencies found in the M270 and include the Improved Fire Control System that updates electronics and adds Position Navigation (POSNAV)/Global Positioning System (GPS) required for Army Tactical Missile System (ATACMS) variants and guided rockets while reducing support costs by 31%.



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**Operational Requirement.** The M270A1 will be capable of firing both



legacy MLRS munitions and the future Objective Force MLRS Family of Munitions (MFOM) such as Guided Multiple Launch Rocket System (GMLRS), ATACMS IA and II missiles, and all future rocket and missile variants. The currently fielded M270 launcher cannot fire the objective munitions. The M270A1 Improved Launcher Mechanical System will decrease slew time by 82% and decrease reload time by 38% while decreasing support costs by 39%. A total rebuild of the M993 carrier and the M269 launcher loader module will also be accomplished. The M270A1 will be fielded to both Active Component (AC) and Reserve Component (RC) units of the Counterattack Force.

**Program Status.** The M270A1 is in Low-Rate Initial Production (LRIP), with rollout of the first launcher in July 2000. The program is on schedule for Initial Operational Test and Evaluation (IOT&E) in 4QFY01.

### **Paladin**

**Description.** Similar to earlier M109 models, the Paladin is a fully tracked, armored vehicle with a 155mm howitzer. The Paladin includes an onboard ballistic computer and navigation system, secure radio

communications, improved cannon and gun mount, automatic gun positioning, automotive improvements, improved ballistic and nuclear, biological, and chemical (NBC) protection, driver's night vision capability, and built-in test equipment. Compared to the earlier M109s, the Paladin has improved responsiveness, survivability, lethality, and reliability.



**Operational Requirement.** Paladin's mission is to provide indirect fire support to the Army's heavy divisions and armored cavalry regiments.

**Program Status.** First unit equipped was in FY93. Completed fielding to the AC; currently fielding the remaining ARNG battalions. Currently fielding the remaining ARNG enhanced Separate Brigade (eSB) field artillery battalions. There still remain 14 additional ARNG divisional battalions that need to replace M109A5s with M109A6s. A total of 950 howitzers have been received; seven more are to be delivered in FY01.

### **Bradley Fire Support Vehicle (BFIST)**

**Description.** BFIST is a full-tracked, armored Fire Support target acquisition vehicle designed to provide heavy force targeting and Fire Support

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planning. Using the Bradley M2A2 ODS chassis, it provides the ultimate in crew protection and vehicle survivability while offering the speed and mobility needed to keep pace with maneuver forces.

**Operational Requirement.** Its integrated systems provide maximum commonality with the current Bradley fighting vehicle fleet. Major components of this system include the Bradley Eyesafe Laser Rangefinder, Ring Laser Inertial Gyroscope Navigation System, Hull Targeting Station, and targeting on-the-move capability. Crew survivability and mobility is significantly enhanced over the Vietnam-era M113 currently used.

**Program Status.** Current funding leaves a three-year gap in synchronization of BFIST fielding with maneuver force Bradleys. Additionally, BFIST will be fielded only to field artillery battalions whose maneuver units have M2A2 ODS or M2A3 Bradley variants. Depending upon Bradley fielding, this may be insufficient to equip all AC units. Regardless, it will not equip the heavy enhanced separate brigades in the ARNG. Units that do not receive BFIST will receive Striker.

The improved capabilities of AFATDS, the Forward Entry Device (FED), and other fire support systems that support information dominance keeps fire support information dominance during the near- and midterms. However, AFATDS will not meet the requirements of the Army after 2010. A draft AFATDS Operational Requirements Document (ORD) specifies requirements for the long

term, identifying requirements for an effects-based system. An effects-based system will have the capability to establish, alter, or terminate sensor-to-shooter links in seconds without lengthy coordination and will have visibility and management authority over all fires assets without regard to source—including air, naval, and space systems. The planned Effects Control System (ECS) program will meet those requirements. ECS program funds begin in FY08. A funding gap between the last version of AFATDS and the beginning of ECS will be addressed during the budgeting process.

### **Army Tactical Missile System (ATACMS)**

**Description.** ATACMS missiles are the corps commander's organic, deep strike weapons. They are being developed as a logical series of improvements to range, accuracy, and lethality. Missile production is continuous with each new block improvement cut into the existing production line, when ready. ATACMS Block I proved its effectiveness during



Operation Desert Storm.

**Operational Requirement.** ATACMS Block IA (in production) increases the range from 165km to 300km by reducing the Anti-Personnel/Anti-Materiel (APAM) payload that is effective against stationary, soft targets. ATACMS Block II (beginning LRIP) significantly improves the lethality by incorporating Brilliant Anti-Tank (BAT) to effectively engage

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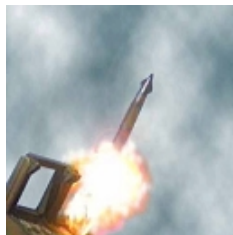
moving armor formations or P3I BAT to engage moving or stationary high-priority targets. ATACMS Block IIA Research, Development, Test And Evaluation (RDT&E) carries P3I BAT and increases the range to 300km. P3I BAT will effectively engage cold, armored targets.

**Program Status.** The ATACMS program was restructured during the budget planning process. Block II procurement was stretched three years and Block IIA was killed. Block II BAT P3I first unit equipped (FUE) begins in FY05.

### **Guided MLRS (GMLRS)**

#### **Description.**

GMLRS supports the Objective Force by providing division and corps commanders with a precision munitions capability to ranges of 15-60km. GMLRS is a major upgrade to the M26 series MLRS rocket with the objective of integrating a Guidance and Control (G&C) package and a new rocket motor to achieve greater range and precision accuracy. The improvement in accuracy (<3 Mil Concept Evaluation Program (CEP)) will reduce the number of rockets required to defeat targets at 60km or greater ranges, reduce the number of launchers required per fire mission, reduce collateral damage, and directly contribute to reducing the logistical footprint of the Objective Force. A self-destruct fuze will reduce hazardous duds to <1%. GMLRS- Unitary will provide the Objective Force with a low-collateral damage rocket capable of



destroying high-payoff surface targets in complex and urban terrain with pinpoint accuracy.

**Operational Requirement.** GMLRS rockets will replace M26 rockets, which will begin shelf-life expiration in FY05 and which will be completely expired by FY13. GMLRS and GMLRS-Unitary will be fired from HIMARS and from HIMARS P3I launchers. GMLRS and GMLRS-Unitary will also be fired by Counterattack Force M270A1 launchers, providing a critical capability during the period of operational risk while the Army transforms.

**Program Status.** GMLRS Engineering and Manufacturing Development (EMD) is an international program with the United Kingdom, Germany, France, and Italy, and with an RDT&E 50/50 cost-share agreement between U.S. and European partners. The United States is managing the prime contract. LRIP is planned to start in FY03. The current programmed GMLRS procurement rate is not adequate to replace M26 rockets by their expiration in FY13. GMLRS-Unitary is in concept development and requires funding for RDT&E.

### **High Mobility Artillery Rocket (HIMARS)**

**Description.** HIMARS will provide early-entry forces with MLRS capability in a lighter weight, more deployable system. Mounted on a medium tactical vehicle, HIMARS is transportable on C-130 aircraft. It provides full MLRS family-of-munitions capability yet requires 70% fewer airlift resources to transport a battery.

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**Operational Requirement.** HIMARS is a C-130-transportable wheeled version of the MLRS launcher that is mounted on a five-ton Family of Medium Tactical Vehicles (FMTV) truck chassis. It will fire the entire MLRS family of rockets and missiles. HIMARS has the same command, control, and communications (C3) and the same three-man crew as the M270A1 launcher but carries only one rocket or missile launch pod/container containing six rockets or one Army tactical missile. The HIMARS program has been accelerated to achieve fielding of two battalions in FY05 versus one in FY06. HIMARS will be fielded to two AC battalions and 14 ARNG battalions. The HIMARS P3I will be in the Objective Force.



**Program Status.** HIMARS participated in the Rapid Force Projection Initiative (RFPI) Advanced Concept Technology Demonstration (ACTD) in 1998. On 30 September 2000, three prototypes completed a two-year extended user evaluation (EUE) in the XVIII Airborne Corps Artillery. On 26 September 2000, Headquarters, Department of the Army (HQDA) approved XVIII Airborne Corps Artillery retention of the three prototypes as an operational capability until HIMARS fielding in FY05. The Marine Corps System Command (MCSC) and the Program Executive office (PEO) for Army tactical missiles

are in the process of signing a Memorandum of Agreement (MOA) for the Marines to purchase two HIMARS for test and evaluation purposes. Congress is providing an FY01 plus-up of \$17.3M for this effort. The Marines plan to acquire a total of 45 launchers for an FY08 Initial Operating Capability.

### **Lightweight 155mm Howitzer (LW155)**

**Description.** LW155 is a joint Army/U.S. Marine Corps program to develop a 155mm towed artillery system to replace the M198 towed howitzer. This system incorporates state-of-the-art design, high-strength/low-weight materials, and a digitization package to make this the premier towed artillery system worldwide.



**Operational Requirement.** The LW155 provides full spectrum fire support capability, achieving increased operational thresholds in lethality, survivability, mobility, deployability, and sustainment. This system provides maneuver forces with greater firepower, while reducing overall system vulnerability. The LW155 provides increased flexibility, responsiveness, and accuracy with the incorporation of digital fire control. This system maximizes the fire support provided to early entry and light forces,



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providing range, accuracy, and durability previously unattainable.

**Program Status.** Current plans call for LW155 to be fielded to the 10<sup>th</sup>, 25<sup>th</sup>, and 29<sup>th</sup> Infantry Divisions, 2<sup>nd</sup> Armored Cavalry Regiment, and two nondivisional AC and seven nondivisional ARNG battalions. A total of 273 howitzers are currently funded for Army procurement. Given nonavailability of an affordable Interim Armored Vehicle (IAV) howitzer, LW155 has been approved as an acceptable solution to support the IBCT. An additional 114 howitzers will be required to meet all requirements, replacing all M198s. This requirement is currently unfunded.

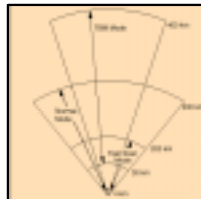


### **Striker**

**Description.** Striker is the fire support component of the Brigade Reconnaissance Team. Using common components from the BFIST program, Striker provides a viable platform to conduct fire support target acquisition and fire support planning for the maneuver brigade commander.

### **Operational Requirement.**

Using the HMMWV M1025A2 chassis, Striker provides responsive fire support planning and target acquisition from an



air-droppable, C-130-transportable platform, while offering the speed and mobility needed to keep pace with maneuver forces. Its integrated systems provide maximum commonality with the current Bradley fighting vehicle fleet. Major components of this system include the Ground/Vehicular Laser Rangefinder and Designator, AN/TAS-4 Night Sight, Ring Laser Inertial Gyroscope Navigation System, and integrated Targeting Station.

**Program Status.** The objective of 770 systems is fully funded; LRIP contract was signed January 1999. IOT&E is scheduled for 3QFY00; MS III to be conducted in 1QFY01.

### **Firefinder AN/TPQ-47 (Q-47)**

**Description.** The Firefinder AN/TPQ-47 (Q-47), a mortar, artillery, rocket, and missile locating radar, is the lynchpin counterfire detection system for the Army's IBCTs. It will replace the aging AN/TPQ-37 artillery locating radar. The Q-47 system will be fielded to each of the IBCTs and a one-for-one replacement for existing Q-37 requirements. Technically, the Q-47 will double the detection range of the current AN/TPQ-37 artillery with performance out to 60km while improving accuracy and target throughput. Additionally, the Q-47 will provide a broad spectrum of target detection by providing mortar detection

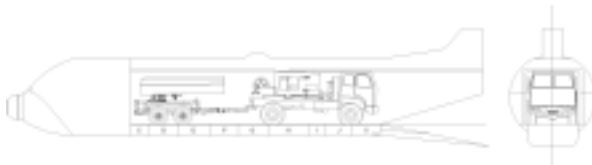




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to 15km, rocket detection to 150km, and missile launch detection out to 300km. The Q-47, in many cases, will be the first electronic eyes on the battlefield providing responsive information on enemy fires and providing an invaluable force-protection tool in Small Scale Contingencies (SSCs) and Stability and Support Operations (SASOs).

**Operational Requirement.** The system will use the standard Army Light Medium Tactical Vehicles in a highly mobile, transportable, and survivable configuration.



The system's mission essential components will be capable of roll-on/roll-off of a single C-130 aircraft for rapid deployment. The program will further leverage the AN/TPQ-36(V)8 Electronics Upgrade program by using the same Operations Central shelter currently being fielded.

**Program Status.** The Q-47 program has started construction of the first EMD system. FY04 will see construction of the first four systems in a low-rate initial production. These systems will also be incorporated into developmental test and the Initial Operational Test and Evaluation (IOT&E).

**Lightweight Laser  
Designator/Rangefinder (LLDR)**

**Description.** The LLDR provides Fire Support teams with a man-portable

system to accurately locate and designate targets.

**Operational Requirement.** The LLDR replaces the current Ground/Vehicular Laser Locator Designator (G/VLLD) that is large and extremely maintenance intensive.



**Program Status.** First unit equipped will be in FY03 but ARNG fielding will not begin until FY12. Last unit equipped is scheduled for FY16.

**Gun Laying and Positioning System  
(GLPS)**



**Description.** The GLPS will provide both positional and directional information to light units to assist them in providing accurate, predicted fire.

**Operational Requirement.** The GLPS provides increased responsiveness and enhances accuracy of the positioning and directional capability of each howitzer (azimuth/deflection) in a firing battery. The system will allow the field artillery to reduce maintenance costs, equipment requirements, and personnel.

**Program Status.** Increased funding to procure additional GLPS enables

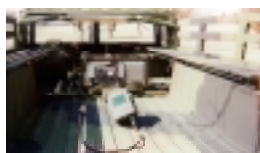
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fielding to the Total Army. GLPS began fielding to both AC and ARNG units in FY00.

### **Improved Position and Azimuth Determining System (IPADS)**

#### **Description.**

IPADS provides a robust inertial survey capability.



**Operational Requirement.** Although the field artillery is leveraging GPS technology to enhance the accuracy and responsiveness of target acquisition and self-location, GPS vulnerabilities and limitations exist. Current technology can produce an IPADS with significantly higher reliability than current PADS.

**Program Status.** IPADS should begin fielding to both the AC and ARNG in FY04. However, the program is unfunded for 70 systems (M270A1 battalions).

#### **Assessment**

Fire Support maintains redundant systems across the fleet. It is essential that we reduce the procurement of similar systems in the future, generating commonality and reducing Operations and Maintenance (O&M) costs. Reduction in the numbers of systems fielded may also be appropriate but will require analytic study from appropriate models and scenarios.

Throughout Transformation, it is essential that we maintain or enhance present capabilities to maintain the warfighting capabilities necessary to

fight and win, if called upon to do so. Programs, including Crusader and M270A1/HIMARS, must remain on track. Cannon requirements for the IBCTs must be accepted by the Army and changed to the LW155. We must aggressively pursue solutions to sensor-to-shooter latency issues. Munitions enablers to ensure warfighting capabilities must be restored selectively. Unfortunately, with limited smart and discriminating munitions (quantities and capabilities), area munitions with associated tonnage remain a core capability. However, we firmly understand that we must achieve greater relevancy, specifically in urban and complex terrain. Thus, the need to restore funding for the MLRS Smart Tactical Rocket (MSTAR) program and establish a viable program for Excalibur with integrated “smart” munitions are essential.

Finally, we must determine future requirements and essential capabilities required of the NLOS FCS. Critical needs must be addressed early and we must focus the research and development efforts and procurement of today’s programs toward the future Objective Force requirements.

The PB02 allows us to continue with the development and funding of several systems paramount to modernization efforts; namely, to fully fund Crusader and address LW155 requirements for the IBCTs. However, there are several noteworthy shortcomings that will more than likely not be met due to funding shortfalls. These include platform systems not fielded to the ARNG divisions—the M270 (3x6), LW155, and Paladin.

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Also, some current training and wartime ammunition requirements are unfunded. Additional resources will ensure that these widespread

requirements are met and we remain a relevant and integral element of the Army, present and future.

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## ANNEX D: FOCUSED LOGISTICS

### General

**Focused Logistics** provides the joint force the right personnel, equipment, and supplies, in the right place, at the right time, and in the right quantity, across the full range of military operations. Ultimately this will be made possible through a real-time, web-based information system, Global Combat Support System-Army (GCSS-A). GCSS-A provides total asset visibility as part of a common relevant operational picture, effectively linking the operator and logistician across Services and support agencies. Through transformational innovations to organizations and processes, Focused Logistics will meet the joint warfighter's Combat Service Support (CSS) requirements across the spectrum of military operations.

The Focused Logistics vision calls for improved support to the warfighter through increased responsiveness, visibility and accessibility of logistics resources. The desired endstate is full spectrum supportability. Focused Logistics is dependent on a variety of imperatives such as the need for faster, more reliable, and completely integrated supply and services, and instilling confidence in the warfighter that critical supplies in the correct quantities will be where they are needed, at the time that they're needed on the battlefield. These imperatives all have the common requirement to leverage technological advantage. Technological innovations can support the intensive management of requirements and help to eliminate the

need for the "iron mountain," i.e., the excess stockpiling of materiel, that has characterized logistics operations in the past.

The supply, maintenance, transportation and services systems that will enable the Army to achieve the objectives of Focused Logistics leverage refined techniques for combat support and sustainment. The goal is full spectrum support from deployment, through engagement, reconstitution, and redeployment, while simultaneously enhancing combat effectiveness and quality of life. In effect, we will achieve a reduction in time, distance, and footprint on the battlefield while increasing efficiency and effectiveness. Seventy-two percent of the resources required to achieve the goal are in the Reserve Component (RC). Accordingly, Combat Service Support elements in the RC will be equipped and modernized on a schedule consistent with their essential role in executing the Army's mission.

Army CSS will be modernized within a constrained resource environment to keep pace with the requirements of Army Transformation. The Legacy Force will rely on proven systems such as the Heavy Expanded Mobility Tactical Truck (HEMTT) and evolving systems such as the Combat Service Support Control System (CSSCS). The Interim Force will rely on proven technology that has been improved and modernized such as the Family of Medium Tactical Vehicles (FMTV) and the Line Haul Tractor (LHT) Extended Service Program (ESP). The Objective Force will operate with a

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seamless, interoperable, web-based system that uses speed and precision rather than inventory mass to support the force. The continued maturation of ongoing initiatives will support that emphasis on speed and precision. In addition to those ongoing initiatives,

two developmental efforts, Medical Communications for Combat Casualty Care (MC4), and the Theater Support Vessel (TSV), will bring the latest technological advances to the areas of medical communications and intra-theater lift.

## **Combat Service Support**

### **Overview**

The Army's logistics modernization program will support Transformation initiatives by providing more deployable, responsive, and survivable combat service support, improving the capability to project the force, and leveraging technology that allows for the forecasting of supply and maintenance requirements to reduce the need for storage and hauling capability. These efforts will optimize the potential of advancements in load configuration, containerization, and more efficient distribution of supplies and ammunition. Multi-Modal Platforms which expedite the transfer among and between all modes of transportation – air, sea, rail, and truck - are essential elements in achieving the responsiveness, deployability, agility, versatility, survivability, and sustainability characteristic of the Objective Force. These platforms will effectively remove the existing seams in the current supply chain, while simultaneously facilitating Global Distribution Based Logistics. Total Asset Visibility/In-Transit Visibility (TAV/ITV) permits rapid retrieval and transmission of supply and transportation data and nodal tracking of assets as they move through the logistics pipeline. TAV/ITV provides the ability to redistribute assets to meet needs, to divert in-transit assets when required, and to avoid buying and repairing items unnecessarily. Further efficiencies will be realized with the production of lighter, multi-purpose warfighting systems, which will reduce the in-theater logistics footprint and decrease lift requirements for combat service support.

Combat service support cannot be separated from combat operations. As an essential enabler of combat power, logistics operations must be modernized along with weapons systems and other key enablers that require supplies and services. CSS plays a vital role in military operations across the spectrum of conflict, and tailorable, responsive support will take on even greater significance as the Army refines its capabilities as a full

spectrum force. Services and support that are lighter, more deployable, and more flexible are necessary to support the transformed force that will have the same characteristics. The logistics modernization strategy focuses on developing and procuring those systems that provide increased mobility, survivability, and agility to ensure that all classes of supply and all required services are available to the maneuver and supporting forces



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where, when, and in the quantities needed. This includes leveraging existing and emerging technologies that support ongoing efforts to achieve predictive logistics to reduce or eliminate the in-theater stockpiling that was characteristic of logistics operations of the past. Logistics is a critical component of the Army's modernization effort. Combat Service Support, including Tactical Wheeled Vehicles (TWV), Materiel Handling Equipment (MHE), Quartermaster Systems, and Combat Health Support (CHS) systems, are among the key logistics contributors across the spectrum from major theater wars to stability and support operations. The changes put forth in *Joint Vision 2020* and the Army Vision dictate that more efficient, agile, and flexible CSS capabilities are provided for the transformed Army. The challenge is acquiring required quantities of capable equipment while keeping the cost of ownership at affordable levels. This CSS modernization strategy ensures logistical systems will continue to provide sustainment across the range of military operations by fielding technologically advanced CSS enablers and employing distribution-based centralized logistics.

## **CSS Modernization in Support of Transformation**

### **Overview**

In keeping with the Army Vision, maneuver sustainment is maximizing the use of new technology in transforming a sustainment system of extensive stockpiling, redundancy, and reactive support to one that seeks to

optimize velocity management, mobility, versatility, responsiveness, and accessibility.

Transforming the CSS structure reduces the logistics footprint by leveraging technology and emphasizing unity of command, situational awareness, synchronization, and integration on the battlefield. Modernizing CSS equipment will allow CSS soldiers to accomplish their support missions more efficiently, ultimately requiring fewer man-hours.

Ultimately, Objective Force logistics will be a seamless, interoperable, web-based system that relies on speed and precision rather than inventory mass (i.e., distribution-based logistics system). It will be a single enterprise database that provides accurate total asset visibility and reduced customer wait time.

**Legacy Force Logistics.** As the Army transitions to the Objective Force, it is imperative to retain a core Legacy Force that maintains current capabilities and incorporates modernizing technologies as they become available. This ensures continued support to the Army's ability to fight and win the nation's wars. Support for the Legacy Force will come largely from recapitalized or modernized systems within the CSS structure. This modernized CSS structure will play an integral part by providing uninterrupted logistics operations that will allow the maneuver forces to continue to maintain combat overmatch without a loss in momentum on the battlefield.

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One example of a selective upgrade system is the LHT, a diesel powered 6x4 system with air conditioning, a collision warning system, antilock brakes, and radial tires. It provides an economic capability to transport large tonnage over great distances. The Extended Service Program (ESP) converts the A model to the A4 and brings it up to the latest standards.

CSSCS is at the center of logistics operations from the battalion level to echelons above corps. CSSCS is the command and control (C2) system that provides commanders with timely and accurate data on the status of logistics, medical, transportation, and personnel assets to support decision making. CSSCS enables Focused Logistics throughout the Transformation process, and supports situational awareness for the decision-making process.

Other key systems that will provide support to the Legacy Force throughout the transition include:

- The **Containerized Kitchen (CK)**, a battalion-level and higher kitchen capable of providing up to three hot meals a day for up to 800 soldiers. One CK replaces two Mobile Kitchen Trailers (MKT), contributing to the overall reduction in the logistics footprint on the battlefield.
- The **Heavy Expanded Mobility Tactical Truck (HEMTT)** is an 8x8 diesel-powered truck that comes in various configurations of crane, tanker, wrecker, and load-handling systems. The HEMTT provides fuel and ammunition for combat, CS, and CSS units. The tractor is used

to pull the PATRIOT launcher. The wrecker is used in various units for vehicle recovery.

- The **Laundry Advanced System (LADS)** is an advanced, water recycling field laundry system capable of providing laundry support for 500 soldiers per operating day. A dry-to-dry system eliminates the need for an operator to transfer laundry from washer to extractor to dryer. This supports force structure savings by reducing operator requirements from eight to two per shift.

**Interim Force Logistics.** As the Interim Force bridges the gap between today's capabilities and the Objective Force, CSS will continue the recapitalization and modernization efforts already begun. Although no CSS systems are being fielded specifically for the Interim Force, there are Interim Force enablers that will be developed to meet critical logistics needs for the Interim through Objective Forces. The versatility of these enablers along with the employment of current systems and certain selective upgrades will allow continued support throughout the transition.

**Objective Force Logistics.** As stated earlier, CSS for the Objective Force will be a seamless, interoperable, web-based system that uses speed and precision. It will be a single enterprise database that provides accurate total asset visibility and reduced customer wait time. The Objective Logistics Force will meet warfighter-required delivery dates as well as Transformation deployment standards. The implementation of embedded prognostic and diagnostic equipment

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will allow soldiers to identify maintenance problems before catastrophic failures occur. Advances in maintenance support equipment will allow defective parts to be replaced well forward in the battlespace. This capability will result in reduced non-mission capable time of mission essential systems and equipment.

In the science and technology (S&T) and research and development (R&D) arenas, efforts are ongoing to develop and introduce more durable combat, CS, and CSS systems with repair-part commonality, alternative fuel efficient systems, precision aerial delivery systems, integrated vehicular and personal water generation systems, and enhanced nutrition delivery methods. These advances will further reduce the logistics demand and, accordingly, the logistics footprint.

The Medical Reengineering Initiative (MRI) represents the transformation path for the CHS component of CSS. Deployed medical units will be more flexible, strategically deployable, and tailorable for split-based operations. This initiative also involves increasing and improving health support to soldiers on the battlefield by modernizing medical equipment.

The result is that advanced business solutions for requisitioning, inventory control, automatic cross-leveling, transporting, distributing and rerouting material have eliminated inefficiencies and redundancies. Combat commanders can now have confidence that their soldiers will get more effective and efficient medical assistance and that needed supplies will arrive in the right quantities and

configurations, at the right place and at the right time on the battlefield.

Through ongoing modernization efforts, CSS systems capable of supporting the transforming and the transformed Army will be developed and fielded to all levels. The objective CSS systems will provide a more responsive and agile logistics capability to support the commander from the strategic to the tactical levels and across the spectrum of military operations.

## **Discussion of Equipment**

### **Heavy Expanded Mobility Tactical Truck (HEMTT)**

#### **Description.**

The HEMTT is an 8x8 diesel powered truck.



It comes in cargo with light crane, cargo with medium crane, tanker, wrecker, and load handling system (LHS) versions. The HEMTT-LHS is an FY99 Warfighter Rapid Acquisition Program (WRAP) and a CSS enabler for Division XXI and the Transformation brigades. The HEMTT-LHS is funded in the HEMTT Extended Service Program (ESP). Displaced cargo HEMTTs are converted to HEMTT-LHS. This precludes procuring a new truck for a new mission.

**Operational Requirement.** The HEMTT provides fuel and ammunition for combat, CS, and CSS units. The tractor is used to pull the PATRIOT launcher. The wrecker is used in various units for vehicle recovery. The HEMTT-LHS is a key CSS enabler for both Division XXI and the Interim Brigade Combat Team (IBCT).

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**Program Status.** The HEMMT is currently in production. First Unit Equipped (FUE) for HEMTT-LHS was October 2000. Procurement funding for the HEMTT program is adequate with the exception of shortages for wreckers in FY02. Additional wreckers are needed to fill shortfalls for Transformation requirements. Also, additional Research, Development, Test, and Evaluation (RDT&E) funding is required in FY05 to fund development of HEMTT II in anticipation of production beginning in FY08. HEMTT II will be the system to support the Future Combat Systems (FCS).

**Advanced Aviation Forward Area Refueling System (AAFARS)**

**Description.** AAFARS is a lightweight modular, multi-point, aviation refueling system that offers rapid combat refueling of four aircraft simultaneously. The system delivers fuel at a rate of 55 GPM per station. It is internally and externally transportable by UH1, CH-47, and UH-60 helicopters, as well as internally transportable by C-5, C-17, C-141, and C-130 aircraft.

**Operational Requirement.** The AAFARS is a key element of Forward Arming and Refueling Point (FARP) operations. The AAFARS replaces the Forward Area Refueling Equipment (FARE) on a one-for-two basis. The AAFARS can be rapidly inserted in any location and then quickly relocated to reduce threat action of a synchronized assault. AAFARS will enhance the ability to sustain aviation operations, maneuver into battle, and permit more time over landing zone or target.

**Program Status.** Production contract is scheduled for FY01. The program is funded at the minimum sustainment rate.

**Containerized Kitchen (CK)**

**Description.** The CK is housed in an 8x8x20, 3:1, expandable International Standard Organization (ISO) container that replaces the Mobile Kitchen Trailer (MKT) on a one-for-two basis. It includes seven modern burner units, a griddle, steam table, two field ovens, 60 cubic feet of refrigeration capability, a warming rack, a tray pack heater cabinet, environmental control, lighting to include blackout lighting, a hand wash sink, and an integrated 10kw tactical quiet generator.

**Operational Requirement.** The CK provides support at the battalion level and higher, and is capable of providing up to three hot meals a day for up to 800 personnel. The CK is mounted on a tactical trailer towed by a 5-ton FMTV vehicle.

**Program Status.** The CK is currently in production with fielding beginning in FY01. The CK is fully funded through FY06.

**Combat Service Support Control System (CSSCS)**

**Description.** CSSCS is a decision support system that utilizes multiple sources of logistics data to better support the warfighter and battle management process. CSSCS provides a concise picture of unit requirements and support capabilities by collecting, processing, and displaying information on key items of

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supplies, services, and personnel that commanders deem crucial to the success of an operation.

**Operational Requirement.** CSSCS is the C2 system that provides the logistics component of the Army Battle Command System (ABCS). By rapidly collecting, storing, analyzing, and disseminating essential logistics, medical, transportation, services, and personnel information, CSSCS assists both the tactical and the CSS commander. It will be fielded to the brigade level for combat and combat support units and to the battalion level for CSS units.

**Program Status.** CSSCS received Milestone III approval for full-scale production in April 1997, and is currently fielded to III Corps, 2nd Armored Cavalry Regiment and XVIII Airborne to CSS battalion level. Version 4 software development, to be completed in FY01, provides enhanced capability and functionality.

### **Deployable Medical Systems (DEPMEDS)**

**Description.** DEPMEDS is a program for managing the modernization, recapitalization, and maintenance of medical and nonmedical equipment to accomplish combat casualty care from the frontline to battlefield hospitalization. Through technology advancements, the logistical burden will be lessened with the elimination of procurement of specialty items, the requirement for environmentally controlled storage, and the elimination of hazardous waste from the digitized x-ray film developer. DEPMEDS provides digitized medical equipment,

a smaller medical footprint, support from an intermediate staging base, and lessening of the logistics burden.

**Operational Requirement.** DEPMEDS supports the force health protection treatment functional area. DEPMEDS supports the Medical Reengineering Initiative (MRI) conversion plan with sustainment of existing medical equipment and replacement of obsolete, unsupportable equipment, taking full advantage of technology. Digitization of medical diagnostics and informatics, water distribution and waste water collection, oxygen production capability, and far-forward care initiatives will support the Objective Force and enhance the functionality of the Interim Force.

**Program Status.** The current program funding supports the recapitalization and maintenance of medical and nonmedical support equipment within the maneuver battalions, divisional medical companies, and echelon above division and echelon above corps medical treatment companies and hospitals.

### **Family of Medium Tactical Vehicles (FMTV)**

**Description.** FMTV is a complete family of medium tactical trucks and companion trailers built on a common chassis and featuring over 80% commonality of parts and components between models and weight classes. It replaces all existing 2 ½-ton and 5-ton trucks in the Army inventory, including cargo, van, tractor, tanker, wrecker, dump truck models, and companion trailers.



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**Operational Requirement.** The FMTV provides unit mobility, resupply, and transportation at all organizational levels. It operates worldwide in all weather and terrain conditions. The FMTV enhances crew survivability through the use of hard cabs, three-point seat belts, central tire inflation, and run-flat capability. It provides enhanced tactical mobility and is strategically deployable in the existing fleet of cargo aircraft. It reduces the logistics footprint by providing commonality of parts and components, reduced maintenance downtime, and lower operating and support costs than older trucks.

**Program Status.** The FMTV was approved for full production at Milestone IIIB in August 1995, and the FUE as the XVIII Airborne Corps at Fort Bragg, North Carolina, in January 1996. Over 11,000 vehicles had been procured as of 31 December 1999. Fielding will continue through 2022. The program has strong congressional support. FY01-02 changes included a congressional plus up of \$37.3 million for the Army National Guard (ARNG) and U. S. Army Reserve (USAR).

### **Forward Repair System (FRS)**



**Description.** The FRS consists of a Palletized Load System (PLS) truck with a flatrack-mounted repair module for the heavy divisions. For the IBCT,

the repair module is mounted on a HEMTT-LHS. The repair module has its own generator, welding facility, crane, compressor, and tools. It permits repair forward when required. Use of the FRS eliminates the requirement for recovery vehicles to perform power pack and engine changes for combat equipment.

**Operational Requirement.** The FRS provides for a reduction of mechanics in Division XXI. The FRS in the IBCT reduces the number of maintenance personnel required. System mobility permits it to keep up with the combat elements of all types of combat and combat support units while eliminating the M113 vehicles previously required for this mission.

**Program Status.** The FRS is currently in production. FUE was October 2000. Additional funding is required to meet all requirements.

### **Global Combat Service Support-Army (GCSS-Army)**

**Description.** GCSS-Army is a business and tactical automation enabler for the total Army CSS mission area. It supports the CSS functions of manning, arming, fixing, fueling, moving, and sustaining soldiers and their systems. It is the Army portion of the Global Combat Support System. GCSS-Army follows an incremental strategy combining development with fielding of capability packages.

**Operational requirement.** GCSS-Army supports joint, allied, and split-based operations, and provides near-real-time integrated CSS information on a single platform

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featuring horizontal/vertical integration of data across CSS domains. GCSS-Army will deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical levels of operations fusing information, logistics, and transportation technologies. This directly contributes to the reduction of the logistics footprint.

**Program Status.** Milestone IIIA review is scheduled for 3QFY01. Development of all packages will be complete by 2QFY03 with fielding complete by 1QFY05.

**Heavy Expanded Mobility Tactical Truck II (HEMTT II)**

**Description.** The HEMTT II is the successor to the current HEMTT fleet of vehicles. It will replace the current HEMTT, Heavy Equipment Transporter System (HETS) and the PLS. It will include an LHS and tractor and wrecker variants. The 21st century truck program is the basis for the HEMTT II initiative.

**Operational Requirement.** The HEMTT II will provide fuel, ammunition, equipment transport, weapons platform, and wrecker capability for combat, CS, and CSS units. The HEMTT II is the heavy truck component of the Future Tactical Truck System (FTTS) currently being developed by TRADOC/CASCOM. The Mission Needs Statement (MNS) for the FTTS will be completed by December 2001 and the Operational Requirements Document (ORD) by September 2004. The HEMTT II is currently supported by an S&T objective for the 21st century truck.

The objective system will reduce fuel consumption, reduce Operations and Support (O&S) costs, reduce maintenance requirements, and enhance crew survivability.

**Program Status.** HEMTT II production is scheduled to start in FY08. FUE is anticipated in FY11.

**High Mobility Multi-Purpose Wheeled Vehicle (HMMWV)**

**Description.** The HMMWV is a rapidly deployable, highly reliable, all-purpose, wheeled light vehicle that provides on-road and cross-country mobility. The readiness rate of the current HMMWV fleet is 94%. Due to its mobility, C-130 compatibility, and payload, the HMMWV is the prime mover for intelligence, C2, and communication systems. Also, the Up-Armored HMMWV provides improved survivability to soldiers performing peacekeeping operations by providing protection from small arms fire up to 7.62 and mines. The HMMWV is a highly reliable vehicle that can travel on all types of terrain while carrying troops, weapons, and payloads up to 5,100 lbs.

**Operational Requirement.**

The HMMWV serves as the Army's light tactical wheeled vehicle for C2, light cargo and personnel transport, shelter carrier, ambulance, and weapons platform. Its mobility, reliability and survivability enable it to keep pace with the supported force.



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**Program Status.** The Army has a requirement for 122,000 HMMWVs and has procured 104,000 HMMWVs. HMMWV fielding began in FY85. The average age of the HMMWV fleet is 10 years old, and the HMMWV has an economic useful life expectancy of 15+ years.

### **Lightweight Water Purifier (LWP)**

**Description.** The LWP is a small, self-contained, highly transportable water purification system capable of producing 125 GPH of potable water from a freshwater source and 75 GPH from a saltwater source. The LWP will be capable of dispensing potable water at a minimum rate of 10 GPM. The LWP will also be capable of being transported in a HMMWV, sling-loaded using a UH-60 Blackhawk helicopter and airdropped by fixed-wing aircraft, to include the C-130.

**Operational Requirement.** The Force XXI Division requires the capability to purify water as far forward as possible. The LWP provides this capability while reducing the need for transportation of water forward. Special Operations Forces (SOF) detachments, medical detachments, and other small units will use the LWP when operating in locations that are isolated from standard water support. It may also be used in civil affairs and disaster relief operations. The LWP will sustain the daily consumption and personal hygiene water needs for populations of 70 to 225 people. The LWP will provide an important capability across the spectrum of operations, particularly in stability and support operations where potable water supplies may not be available.

**Program Status.** Program is scheduled for low-rate initial production in FY01, with full production to begin in FY02. The program is fully funded.

### **Line Haul Tractor (LHT)**

**Description.** The LHT is a diesel-powered 6x4 system. It has air conditioning, collision warning system, antilock brakes, and radial tires. There is also a companion ESP wherein the A0 model is converted to an A4 model and is brought up to the latest standards.



### **Operational Requirement.**

The LHT supports theater petroleum, oil, and lubricants (POL) and cargo companies. It provides an economic capability to transport large tonnage over great distances. It is also used in engineer topographic units and cargo transfer companies.

**Program Status.** Both the ESP and the new vehicles are currently in production. The ESP is not fully funded. RDT&E of crew protection development is not funded.

### **Movement Tracking System (MTS)**

**Description.** The MTS consists of a vehicle-mounted or handheld mobile station or control station, and a satellite link. Communications is possible from the control station to the mobile station, from the mobile station to the control station, and between each. MTS permits the commander to know the location of all the distribution assets in the theater, corps, division, or brigade. MTS will also link to vehicle

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diagnostics and radio frequency (RF) tags. It will be integrated with the Transportation Corps Automated Information Management System II (TCAIMS II) and GCSS-A. The driver and control stations will have maps of the area of the world in which they are operating.

**Operational Requirement.** MTS permits the commander to know the location of all the distribution system vehicle assets. Because control centers can send messages directly to vehicles, supplies can be quickly rerouted or vehicles can be quickly sent on new missions. The system will also be able to transmit vehicle health and cargo data.

**Program Status.** The program is in production with a materiel release of June 2001. FUE was November 2000 (conditional release to support Division XXI and the IBCT).

### **Rough Terrain Container Handler (RTCH)**

#### **Description.**

The RTCH is the materiel handling equipment with the capability to lift the standard 20- and 40-foot long ISO family of 8-foot wide containers weighing up to 53,000 pounds while operating on beaches, rough terrain, and unimproved surfaces. The Army's supply system relies heavily on quickly delivering ISO containers through air, sea, and rail ports of debarkation to the battlefield. This RTCH must be air deployable and provide the flexibility to



handle containers and prepositioned PLS flatracks, breakbulk cargo, and heavy palletized Class V loads when equipped with a forklift attachment.

**Operational Requirement.** The RTCH is the key enabler and pacing item for the Transportation Cargo Transfer Company (CTC). The CTC recently underwent a reorganization to convert all Active and Reserve Component units to an Improved Cargo Handling Operations (ICHO) design, which increases the requirement for RTCHs from 8 to 16 per unit. CTSs are critical enablers to project a CONUS base force into a Theater of Operations. They are essential to meet the Army goal of closing five divisions with support within 30 days. It is projected that 90% of general cargo and 95% or all ammunition will arrive containerized in the theater. The RTCH is the single most important item of MHE to provide the theater commander the ability to receive, stage, and discharge these containers. The RTCH is air transportable in C-5/C-17 in less than one hour.

**Program Status.** The production contract was awarded in April 2000. Fielding begins June 2001.

### **Soldier Portable On-System Repair Tool (SPORT)**

**Description.** The SPORT is a lightweight, ruggedized, portable tester employed at all levels of maintenance. It is the Army's standard on-system tester and is used by many different maintenance specialties to automatically diagnose weapon system operations, both electronic and



automotive, and identify faulty components for immediate replacement.

The SPORT and its predecessor (the Contact Test Set) are in wide use throughout the Army's ground combat and CSS vehicle fleets as well as in the Army aviation fleet.

**Operational Requirement.** The SPORT is an essential maintenance tool in the support plans for the Army's ground vehicle and aviation fleets. It provides test and diagnostic support and maintenance automation capabilities that are critical to the readiness of Army units and their equipment. The SPORT hosts interactive electronic technical manuals and expert diagnostic systems and is used to conduct intrusive testing in support of Army weapons and electronic systems. It also provides a means to upload/download mission-critical software into weapon system on-board computer processors.

**Program Status.** The SPORT is in full rate production and fielding. A recent change in the basis of issue will provide SPORT to organizational level maintainers.

### **Theater Support Vessel (TSV)**

**Description.** The TSV is a high-speed, 40+ knots sealift platform that will maximize commercial off-the-shelf (COTS) ferry technology currently in use in civilian markets. The TSV will support Joint Logistics Over-the-Shore (JLOTS) requirements for ship-to-shore lighterage, eventually replacing the

current watercraft fleet as it reaches economic useful life span. Initial TSVs will



meet the requirement for the last five LSVs (for a TAA 07 total requirement of 14 LSVs, of which only nine will be procured). The speed of the TSV will permit flexible stationing options while answering persistent, unresolved JWCA issue of late arrival of Army watercraft in Theaters.

**Operational Requirement.** The TSV replaces the current generation of Army watercraft to conduct Logistics Over-the-Shore (LOTS)/JLOTS and support responsiveness goals for Interim and Objective Forces.

**Program Status.** The ORD was approved 17 January 2000.

### **Transportation Corps Automated Information Management System (TCAIMS II)**

**Description.** TCAIMS II is a joint service migration system that provides an integrated set of transportation applications to facilitate movements, management of personnel, equipment, and supplies from home station to the conflict and back. It is a source feeder system to the Joint Operation Planning and Execution System (JOPES), the Global Transportation Network (GTN), and transportation component commands for common user lift.

**Operational Requirement.** TCAIMS II enables rapid deployment planning and execution. The warfighter gets hands-on capability for planning and



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executing unit moves assets management, and an enabler for in-transit visibility and C2.

**Program Status.** The system has completed the ATEC customer test for each of the Services. It is being utilized in the Joint Chiefs of Staff (JCS) Millennium Challenge exercise, and there is a prototype operational in United States Army, Europe (USAREUR).

### **Joint Modular Lighter System (JMLS)**

**Description.** The JMLS will replace existing Navy lighterage and the Army Modular Causeway System (MCS), which can only operate safely in conditions up to sea state 2 condition. The system will provide a method of discharging cargo from strategic sealift ships and moving cargo to shore in the event a port is denied, degraded, or not available during sea state 3 (3.5-5 ft. waves) conditions. In addition, the system will be fully interoperable with all Services' JLOTS equipment and have maximum flexibility to be adapted to multiple uses in support of service LOTS and JLOTS operations.

**Operational Requirement.** Recent Department of Defense (DoD) guidance requires development of a sea state 3 JLOTS capability by FY05. JMLS is in development to meet this requirement.

**Program Status.** This is a Navy-led joint development program, currently in an Advanced Concept Technology Development (ACTD) with a Military Utility Assessment (MUA) planned for 2QFY01. Funds are currently

programmed for the MCS, the current Army lighterage system, pending the outcome of the MUA. If the MUA is favorable, then MCS funds will be shifted to JMLS procurement.

### **Medical Communications for Combat Casualty Care (MC4)**

**System Description.** The MC4 system is a theater, automated Combat Health Support (CHS) system which links commanders, health care providers, and medical support providers at all echelons with seamless, integrated medical information. It will receive, store, process, transmit, and report medical C2, medical surveillance, casualty movement/tracking, medical treatment, medical situational awareness, and medical logistics data across all levels of care. The MC4 is fully operational with standard Army systems and operates on standard Army hardware. MC4 is fully joint operations compatible and operates from a family of joint software. MC4 supports the commander with a streamlined personnel deployment system using digital medical information.

**Operational Requirement.** The MC4 system requirements are designed to provide the warfighter with the CHS digital tools necessary to support the Objective Force by enhancing their ability to project the force, protect the force, and sustain the force. Digital tools significantly streamline the soldier readiness process. Teleconsultation provides specialty medical information to maximize the effectiveness of deployed personnel. The MC4 system provides the real-time ability to monitor the medical status of an individual

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soldier or unit. Automated medical logistics capabilities increase the effectiveness of theater medical supply by lowering stockpiles and reducing the medical footprint on the battlefield.

**Program Status.** MC4 is currently pre-Milestone II. The MC4 ORD has been approved by TRADOC and is currently undergoing staffing for approval by the Joint Requirements Oversight Council (JROC). The MC4 project timeline is closely tied to the Theater Medical Information Program (TMIP) whose Capstone Requirements Document and ORD are both JROC approved.

#### **Heavy Dry Support Bridge (HDSB)**



**Description.** The HDSB provides the Army with a compact, lightweight support bridging capability for gaps of up to 40 meters in length. The HDSB is a mechanical system capable of emplacing a 40-meter bridge with eight soldiers in 90 minutes or less. The HDSB will improve current bridge load carrying capacity up to Military Load Class (MLC) 96 for wheeled traffic and MLC 70 for tracked traffic. A bridge set consists of seven PLS pallet loads and a launcher vehicle.

**Operational Requirement.** This system replaces the outdated, manpower- and time-intensive Medium

Girder Bridge (MGB). The HDSB provides the capability to erect a bridge in 90 minutes that will support a Heavy Equipment Transporter (HET) loaded with an M1 tank or M1 tanks themselves. Lesser vehicles are also easily supported by the HDSB. The bridge components are transportable by C-130 aircraft as well as by the Common Bridge Transporter (CBT) or by any support units equipped with PLS trucks.

**Program Description.** The ORD was approved in March 1993. Milestone I was achieved in December 1993, Milestone II in August 1997, and Milestone III Low-Rate Initial Production (LRIP) in April 2000. Developmental Test(DT)/Operational Test (OT) was conducted during April-December 1999. Initial Operational Test and Evaluation (IOT&E) is set for April 2002. FUE is scheduled for March 2003.

#### **Construction Equipment (CE)**

**Description.** To meet the operational CE requirements of the Objective Force, the following goals have been established: to provide multifunctional CE, thereby reducing the size of the fleet that must be modernized; to provide self-deployable CE whenever possible; and to procure CE with higher reliability and better logistical supportability, to reduce the operating burden on the Objective Force.

**Operational Requirement.** Army CE is vital to provide mobility, countermobility, survivability, and sustainment support to the Legacy, Interim, and Objective Forces. Future operations will have an

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offensive/mobility focus and be conducted against an asymmetric threat in undeveloped/underdeveloped theaters with little or no host nation support/infrastructure. To support these operations, CE must be more deployable (both strategic and intra-theater), more reliable, and easier to support logistically.

**Program Status.** In the near-term, the Army will complete fielding of PLS dump, bituminous and concrete Engineer Mission Modules (EMMs), Hydraulic Excavators (HYEXs), All Terrain Cranes (ATECs), heavy dump trucks (20 ton), vibratory rollers, and a variety of other systems. Near-term initiatives will focus primarily on fielding the HMEE to the Interim Force, procuring a new family of loaders, new airborne scrapers and water distributors, a new heavy engineer crane, PLS EMM water distributors, and recapitalization of several CE systems, particularly key airborne and air assault CE. In the mid- through far-terms, recapitalization (rebuild and selected upgrade of CE) will be pursued to the maximum extent possible.

## Assessment

CSS, to include general engineering, plays a vital role in military operations across the spectrum of conflict. Appropriate, responsive support is integral as the Army transforms into a full spectrum force. The logistics modernization strategy focuses on developing and procuring those systems that provide the key capabilities of the soldiers and weapon systems they will support, i.e., increased mobility, survivability, and

agility. Improvements in survivability and mobility begin with decreasing the number of assets that must be protected and moved. Several systems, such as the FMTV, will contribute to this effort to reduce the in-theater footprint by using common parts, components, and fuels. Additionally, systems that enhance the capability of the force to sustain itself over time decrease the required transportation and warehousing assets. Improved diagnostics and test equipment, such as the SPORT, will decrease the requirement for in-theater stockage of repair parts by identifying needed components before they actually fail, and in time for them to be delivered into the theater. The capability to repair and arm combat systems in the forward area brought to the battlefield by the FRS and the AAFARS allows the maneuver forces to maintain momentum and continue offensive operations without unnecessary delays. Improved situational understanding enhances battlefield agility and enables the decision makers to redirect resources as needed to adapt to the fluid battlefield. The CSSCS and the MTS improve the commander's capability to determine the status of supplies and services and to make adjustments even during the distribution and delivery process. Strategic mobility is enhanced by improvements in MHE, specifically, the RTCH, necessary to handle the cargo and ammunition, most of which will be containerized. Engineer construction and support equipment requirements increase the performance of the CSS mission while providing line of communications and shelter for soldiers, equipment, and supplies. All of these systems are

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essential to meet the deployment timelines for the transformed forces. With these ongoing efforts, Army CSS is well positioned to support the

maneuver forces in all operations across the spectrum of conflict and through the Transformation process.

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## ANNEX E: INFORMATION SUPERIORITY

### General

Information Superiority (IS) refers to the attainment of superior information flow that supports mission objectives. Achieving IS requires the establishment of an integrated system of systems (SoS) capability that effectively collects, processes, disseminates, and uses information while exploiting or denying an adversary's ability to do the same. IS is a critical enabler to a realization of the *Joint Vision 2020 (JV 2020)* capabilities. As such, IS must bridge the full spectrum of operations against a wide range of threats and combat environments.

Army Transformation seeks to create an Objective Force that is dominant across the full spectrum of military operations. Achieving this goal requires a significant exploitation of information age science and technology (S&T). Integration of information age S&T across Army systems to achieve the objectives of *JV 2020* fundamentally changes the legacy stovepipe paradigm into one that focuses on network centric operations. At the center of the new paradigm is the recognition that the benefits of IS come from the ability to fully leverage an integrated command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) and weapons systems SoS infrastructure, which has information age technology at its core.

In the aggregate, technologies underpinning IS are central to the

Army's ability to achieve the Objective Force characteristics. Over time, the goal is to harmonize requirements and evolutionary development through the incremental maturation and insertion of technologies to achieve a robust C4ISR infrastructure in support of Army Transformation and the Objective Force. Integrated SoS requirements linked to affordable technology solutions will provide the roadmap for capability enhancements leading to the Objective Force.

Although the Army considers IS to be an integrated capability across the full spectrum of operations, it is through synergistic, integrated, and interoperable individual systems and programs that this capability is acquired. The Army's Modernization Program that spans S&T through fielding is the conduit through which real assets are acquired in support of IS. Fielding of systems will be done through the Unit Set Fielding and Total Package Fielding concepts. Adherence to these concepts will ensure IS capabilities are provided in an integrated and synchronized way to Army units.

The Army functional areas that primarily support the achievement of IS are Command, Control and Signal; Intelligence and Electronic Warfare; and Engineers, which offer specified support through select systems. In addition, some key fire support, logistics, and air defense systems support IS.



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## Command, Control, and Signal Systems

### Overview

Command, Control, and Signal Systems enable seamless, protected, survivable, integrated, and dynamic information services to the warfighter for achieving Information Superiority across the full spectrum of operations. These information technology systems provide the capability for getting relevant information to the right place at the right time.

The Command, Control, and Signal Systems are critical to maintaining our IS edge across the full spectrum of conflict. Command and control (C2) systems have improved the ability to prepare and execute movement plans with standardization and commonality among automation hardware and software operating systems. Additionally, the systems are meeting the current functional requirements of our commanders and staff. The signal systems have ensured an inter-netted communications capability within the Army and joint/coalition forces. These systems are providing our tactical elements with transparent connectivity for voice, data, and video teleconference and communications systems throughout the operational spectrum.

Army modernization must ensure the synchronization of communications-related efforts and a modernization strategy toward achieving IS across the full spectrum of potential missions—now and in the future. It protects the research, development, and procurement of key information systems and services for ensuring IS that supports the Army's Transformation efforts.

In a capabilities-based force, IS is measured by the ability to make informed decisions faster and to sustain operations longer and faster than your opponent. Command, Control, and Signal Systems are the glue for the effective employment of the Army Vision's goals toward the Objective Force. Additionally, these systems must be more deployable and lighter in supporting a smaller and more combat-effective force. In the final analysis, commanders will require accurate and timely information that will allow them to influence the actions of their opponents.

### Command, Control, and Signal Systems Modernization in Support of Transformation

#### Overview

Modernizing our Army to be an agile, lighter, and more deployable force capable of maintaining IS will require a robust Command, Control, Communications, and Computers (C4) architecture specifically designed to meet the dramatically increasing information and data requirements of

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the modernized force. Achieving IS in the 1st Cavalry Division (2003) and III Corps (2004) remains a priority, followed by the Interim Brigade Combat Teams (IBCTs). A broad overview of some key programs and their relationship to our modernization goals are discussed in the following paragraphs.

The Army Battle Command System (ABCS) concept provides for the overall integration of digital C2 systems found at all echelons from theater level to the weapons platforms. The components that fuse and display the common picture are the Global Command and Control System–Army (GCCS-A), Maneuver Control System (MCS), and the Force XXI Battle Command Brigade and Below System (FBCB2). Additionally, the linkage of these C2 systems (via the Tactical Operations Centers (TOCs) and Standardized Integrated Command Post System (SICPS) programs) provides our tactical forces with a functional C2 suite that significantly reduces the logistical footprint. Hence, we have both the desktop and sheltering requirement to include the local area network (LAN). Currently, MCS and FBCB2 are being equipped to IBCTs and III Corps units, to include appropriate Reserve Component (RC) units at echelons above division. We must continue our S&T investment to improve their capabilities and transition into the Objective Force.

The terrestrial and switching backbone of our communications infrastructure network represents our single greatest deficiency in transforming from our Legacy Force. The Army Common User System (ACUS) modernization

program recapitalizes our existing Mobile Subscriber Equipment (MSE) and Tri-Service Tactical Communications (TRI-TAC) switching network systems for the known requirement of today's forces. At the lower level, the Tactical Internet (TI) comprises the communications infrastructure for the transfer of information across the battlefield. The Enhanced Position Location Reporting System (EPLRS) and Single Channel Ground and Airborne Radio System (SINCGARS) are currently the communications systems of the TI. With the ever-increasing voice and data requirements, this emerged as another area requiring improvement to maintain IS and applicability into the future.

To extend the communications links beyond line-of-sight (BLOS) and obtain the critical reachback capability, the Army will rely on satellite communications (both government-owned and commercial lease). Our current Defense Satellite Communications System (DSCS) ground terminals (AN/TSC-85s and AN/TSC-93s) are antiquated and do not meet the deployability requirement of a transforming Force (Interim or Objective). Due to the critical importance of space-based communications, these legacy systems are being replaced by the Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T), and the Super High Frequency (SHF) Tri-Band Advanced Range Extension Terminal (STAR-T). The SMART-T and STAR-T will provide immediate improvements to our Legacy and Interim Forces. Additionally, we have a long-term investment in the Single Channel Anti-

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Jam Manportable (SCAMP) manpack terminal and the Global Broadcast Service (GBS).

Focused and consistent investments in S&T that exploit technological development are the centerpiece for maintaining IS, which is crucial to our Modernization Program. As we prepare for the Objective Force, our research and development (R&D) efforts must transform vast amounts of data into usable information and knowledge for the warfighter.

Our network architectures and technical standards will continue to evolve. With the growing requirement for information and a more responsive force, the Warfighter Information Network-Tactical (WIN-T) will increase the security, capacity, and speed of information distribution; support split-based operations; and increase mobility with a smaller logistical footprint. In concert with the other Services, the Joint Tactical Radio System (JTRS) will become the Army's primary tactical radio for mobile communications. This lightweight, multiband radio will provide embedded voice, data, and video teleconference capability. Additionally, it will replace multiple legacy radio systems within the Army's inventory and will be a key component of the TI. The future Multiband Integrated Satellite Terminal (MIST) will replace the STAR-T and SMART-T to provide the warfighter with BLOS and reachback communications.

### **Discussion of Equipment**

The following systems are currently in the force structure and require immediate maintenance or upgrades to

support readiness and Transformation and the increased information/data requirements of the force. Although investing into a future communications infrastructure, we have allocated significant resources to ensure these programs remain relevant on today's battlefield.

### **Enhanced Position Location Reporting System (EPLRS)**

#### **Description.**

EPLRS provides automated, secure, near-real-time data communications and Position/Navigation (POS/NAV) services for the digitized force. EPLRS consists of a Network Control Station (NCS) and radio sets with embedded Communications Security (COMSEC), which can be configured as vehicular, manpack and airborne units.



**Operational Requirement.** EPLRS provides commanders with highly reliable, automated, secure, near-real-time data communications and POS/NAV services as the digital data backbone of Force XXI Battle Command Brigade and Below (FBCB2) and Battlefield Functional Areas (BFA). EPLRS, in conjunction with FBCB2, will provide the majority of the Army's input to the Common Tactical Picture (CTP) and the Common Operational Picture (COP).

**Program Status.** The Army will procure and field EPLRS to the Counterattack Corps, Force Package 1, and other high-priority users. Current EPLRS Army Procurement Objective (APO) is

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12,896. Approximately 2,600 radios have been fielded.

**Single Channel Ground and Airborne Radio System (SINCGARS)**



**Description.** SINCGARS provides commanders with a highly reliable, secure, easily maintained Combat Net Radio (CNR) that has both voice and data handling capability in support of C2 operations. SINCGARS, with the Internet controller, provides the communications link for the digitized force. The Advanced System Improvement Program (ASIP) models are of a reduced size and weight, providing further enhancements to operational capability in the TI environment.

**Operational Requirement.** SINCGARS will provide a highly reliable, secure, easily maintained CNR that has both voice and data handling capability.

**Program Status.** A production delivery order will be awarded in 3QFY01 to procure congressionally directed assets for the Army National Guard (ARNG) and IBCTs. Approximately 164,285 radios have been fielded.

**Defense Satellite Communications System (DSCS)**

**Description.** DSCS provides super high frequency (SHF) wideband satellite communications supporting critical national strategic and tactical Command, Control, Communications, and Intelligence (C3I) requirements. DSCS supports the Army warfighter as well as Department of Defense (DoD) and non-DoD users, as approved by the Joint Staff/Commanders-in-Chief (CINCs) or by the Secretary of Defense (SECDEF). DSCS terminals are designed to operate with the DSCS and NATO satellites and to maintain the warfighter's ability to communicate back to the sustaining base during war and contingency operations.

**Operational**

**Requirement.** DSCS provides high-capacity, inter- and intra-theater range extension support to Army and joint warfighters from



corps level and higher. The system is used at all levels of command from the National Command Authorities (NCA) to the tactical theater. The DSCS earth terminal's direct interface with SHF Tri-Band Advanced Range Extension Terminal (STAR-T) is the warfighter's primary means of reachback communications in all levels of conflict.

**Program Status.** DSCS terminals and control centers are undergoing a recapitalization effort (selected upgrade).



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**Army Common User System (ACUS)**  
**Modernization Program (Mobile**  
**Subscriber Equipment (MSE) and**  
**Tri-Service Tactical**  
**Communications (TRI-TAC))**

**Description.** ACUS is the terrestrial communications and information system that currently consists of the TRI-TAC and MSE systems. Upgrades to the systems provide an increased capability to support voice, data, and video requirements in one of two ways—Tactical High Speed Data Network (THSDN) and technology insertion. The ACUS modernization efforts will support the Army's Transformation initiatives by inserting new technologies (Brigade Subscriber Node (BSN), battlefield video-teleconferencing, wireless LAN, and Network Operations Center vehicles (NOC-V)) into the Army's IBCTs.



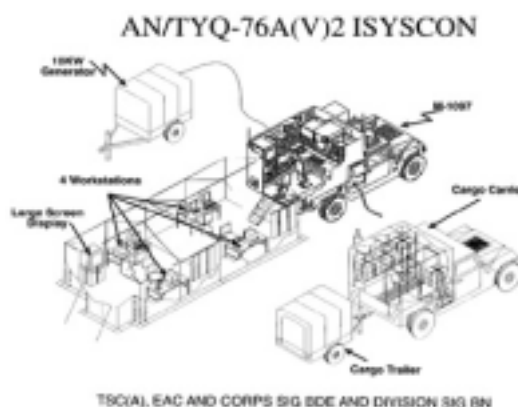
**Operational Requirement.** ACUS modernization provides mobile, secure, survivable, seamless multimedia connectivity between all elements within the battlespace.

**Program Status.** The ACUS Technology Insertion is on track for fielding completion to the Counterattack Corps by 2004. Additionally, THSDN fielding to the remainder of the force was initiated in

FY00 with completion anticipated in FY03.

**Integrated System Control System (ISYSCON)**

**Description.** ISYSCON provides an automated, theater-wide system to manage multiple tactical communications systems in support of battlefield operations. Additionally, ISYSCON interfaces with each BFA in the ABCS.



**Operational Requirement.** ISYSCON will provide centralized control of the data networks that interconnect all C2 systems and all weapon systems on the battlefield.

**Program Status.** The fielding of network management for III Corps elements is on track for 2004.

**Secure Multichannel Anti-Jam**  
**Reliable Terminal-Tactical**  
**(SMART-T)**

**Description.** SMART-T is a transportable, tactical, satellite communications terminal that operates with





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the current Military Strategic and Tactical Relay (MILSTAR) satellite low data rate (LDR) (up to 2.4kbps) and medium data rate (MDR) (up to 1.544mbps) extremely high frequency (EHF) communications payload and the future advanced EHF (AEHF) constellation.

**Operational Requirement.** SMART-T provides protected communications for the in-theater range extension of the Army's MSE at echelons corps and below.

**Program Status.** SMART-T is currently in production and testing.

**SHF Tri-Band Advanced Range Extension Terminal (STAR-T)**

**Description.** STAR-T is a super high frequency (SHF) multiband multichannel satellite terminal. STAR-T is a self-contained, one-vehicle communications package capable of operating over commercial and military SHF satellites, and interfaces with commercial and military switching systems. There will be two versions: switch and standard.

**Operational Requirement.**

STAR-T will provide high-capacity inter- and intra-theater range extension support at echelons above corps (EAC) and selected corps signal units. STAR-T will be the warfighter's primary means of reachback communications. STAR-T will ultimately replace aging ground mobile force satellite terminals (AN/TSC-85s/93s).



**Program Status.** STAR-T is currently in system development.

The following systems are IS enablers. With a block plan for software enhancements, spiral development, and technology insertions, these programs will provide inter-netted communications, improved C2, and a strategically responsive reachback capability. Providing the threshold needs of the Objective Force, these stopgap enhancements provide us with valuable time and critical capabilities during the development of the objective system.

**Global Command and Control System-Army (GCCS-A)**

**Description.** GCCS-A provides the Army's interface to the Joint Staff Global Command and Control System (GCCS) program. GCCS-A provides automated C2 tools for Army strategic and theater commanders to enhance warfighter capabilities throughout the spectrum of conflict during joint and combined operations in support of the NCA. GCCS-A will provide an integrated C2 system capable of exchanging data both horizontally and vertically throughout the Army hierarchy.



**Operational Requirement.** GCCS-A links joint and tactical commanders throughout the battlefield. It displays, maintains, and digitally exchanges CTP data with GCCS and other

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ABCSs. GCCS-A provides tools to shape decisive deployment and sustainment operations. It inputs the Army's information into the CINC's COP.

**Program Status.** The GCCS-A program completed the replacement of the legacy Army Worldwide Military Command and Control System (WWMCCS) Information System (AWIS), Standard Theater Army Command and Control System (STACCS), and Theater Army Command and Control Information Management System (TACCIMS) during FY99. GCCS-A continues the development of a single baseline system and achieves and maintains full integration of GCCS-A into the ABCS.

#### **Maneuver Control System (MCS)**



**Description.** MCS is an automated C2 system that provides a network of computer terminals to process combat information for battle staffs. It provides automated assistance in the collection, storage, review, and display of information to support the commander's decision process. Both text and map graphics are provided to the user.

**Operational Requirement.** MCS provides an integrated picture of Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support to produce a common picture of the battlefield. It provides critical, time-sensitive information to shorten the decision-cycle process. MCS provides an automated, on-line, near-real-time capability for planning, coordinating, monitoring, and controlling tactical operations. It is the force-level commander's information system.

**Program Status.** The MCS Block IV Program is in the Engineering and Manufacturing Development (EMD) phase scheduled for an Initial Operational Test and Evaluation (IOT&E) in FY02.

#### **Force XXI Battle Command Brigade and Below System (FBCB2)**

**Description.** FBCB2, mounted on a variety of platforms, provides situational awareness and C2 functionality to the warfighter. The system consists of FBCB2 hardware and/or software integrated into the various platforms at brigade and below, as well as appropriate division and corps slices (including RC elements supporting the Counterattack Corps) necessary to support brigade operations. The FBCB2 hardware consists of a computer employing commercial-off-the-shelf components in a ruggedized central processing unit case, display, and keyboard. FBCB2 integrates emerging and existing communications, weapon, and sensor systems on a single display. It interfaces with the Army Tactical Command and Control System

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(ATCCS) at brigade and battalion levels across all BFAs. FBCB2 is a subelement and key component of the ABCS.



**Operational Requirement.** FBCB2 is a joint interoperable, digital, battle command information system for brigade level and below commanders. It is designed to provide dismounted/mounted combat elements with near-real-time, integrated situational awareness information and C2 functionality. FBCB2 will enhance the ability of tactical commanders to better synchronize their forces, achieve agility, and gain a “feel” of the battlespace through improved situational awareness and better combat awareness reporting while on the move.

**Program Status.** FBCB2 is in the EMD phase. We are currently fielding EMD models, have already fielded a division, and are ready to field IBCTs this year. Awaiting an IOT&E date (1QFY02).

### **Joint Tactical Radio System (JTRS)**

**Description.** JTRS will provide a family of affordable, high-capacity, modular communications systems for line-of-sight (LOS) and BLOS command, control, communications,

computers, and intelligence (C4I) capabilities for the warfighter. This system is being designed as a secure, multiband, multimode, software reprogrammable, digital communications system that will support the broad range of C4I requirements.

**Operational Requirement.** The system will maintain interoperability with legacy systems while advancing to future wireless communications technologies.

**Program Status.** The JTRS is currently in the software communications architecture (SCA) development and validation phase.

### **Global Broadcast Service (GBS)**

#### **Description.**

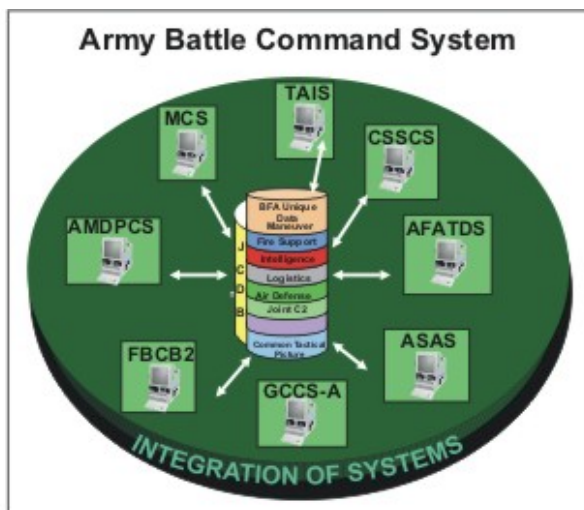
GBS is an integrated communications system consisting of uplink injection sites, broadcast satellites, receive terminals, and management processing.



**Operational Requirement.** It augments Military Satellite Communications (MILSATCOM) systems and provides high-speed, one-way information flow of high-volume data and multimedia information.

**Program Status.** The effective date for the Modified Table of Organization and Equipment (MTOE) is late November 2001/early 2002.

## **Army Battle Command System (ABCS)**



**Description.** ABCS is the Army's component of the GCCS. It is a complex system of systems that provides the mechanism to receive and transmit information among the joint forces. ABCS consists of subsystem software that provides specific support for the BFAs. Additionally, common software products enable information sharing with other systems and provide situational awareness of the battlefield to every echelon. By integrating the ABCS components through common software products such as the Joint Common Database (JCDB), the common tactical picture can be viewed at any workstation and within the operator's specific requirements.

**Operational Requirement.** Each of the ABCS subsystems and associated programs are essential to the digitization of the total force. The objective of ABCS is increased lethality, survivability, operational tempo (OPTEMPO), and sustainability through information dominance,

battlefield visualization, and situational awareness.

**Program Status.** The Army will continue to fund ABCS integration to support digitization of III Corps, IBCTs, and other high-priority users.

## **Single Channel Anti-Jam Manportable (SCAMP) Block II**

**Description.** SCAMP Block II is a Tactical MILSTAR LDR and higher data rate AEHF, C2 satellite terminal.



**Operational Requirement.** SCAMP Block II provides worldwide, anti-jam, low probability of intercept and detection, and assured voice and data communications to the joint warfighter.

**Program Status.** SCAMP Block II is in EMD.

## **Warfighter Information Network-Tactical (WIN-T)**

**Description.** WIN-T is the next generation terrestrial communications and information system, which currently consisting of TRI-TAC and





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the MSE systems. WIN-T provides simultaneous voice, data, and video services.

**Operational Requirement.** WIN-T is the Army's objective tactical digital communications network that will provide tactical networking for the deployed warfighter.

**Program Status.** WIN-T commences its EMD phase in FY02.

### **Multi-band Integrated Satellite Terminal (MIST)**

**Description.** Multi-Band Integrated Satellite Terminal (MIST) is the long-range plan for the natural migration into a single terminal with C, X, Ku, Ka and EHF band capability. MIST will expand frequency band flexibility and joint interoperability while reducing the tactical and logistics footprint of satellite communications (SATCOM) assets required for range extension and reachback communications to support the joint warfighter on the discontinuous and extended battlefield.

**Operational Requirement.** MIST is the ground segment tactical satellite terminal for the future Advanced Wideband System (AWS) and future EHF systems. It directly supports Army Transformation by providing reduced numbers of systems, communications on-the-move, and easier deployment. Finally, it is interoperable with FY10 legacy military and commercial multichannel SATCOM systems.

**Program Status.** MIST commences its EMD phase in FY07.

### **Forward Area Air Defense Command and Control System (FAADC2)**

#### **Description.**

FAADC2 collects, digitally processes, and transmits real-time target data, common tactical air picture, and C3I data from Sentinel radars and other sources to Short-Range Air Defense (SHORAD) systems and joint and combined forces. It is employed at divisional and corps levels and is C-130 transportable.



**Operational Requirement.** FAADC2 provides an automated means of transmitting timely target data to SHORAD systems to prevent fratricide and to manage the air battle.

**Program Status.** The program is in the procurement cycle. The FY02 President's Budget (PB02) funds completion of objective system software and fielding of objective capability. Funding completes objective system software development (Block III); implements, tests, and fields the FAADC2 and FBCB2 merger on the handheld computer; supports FBCB2 force development and initial operational tests and evaluations; meets first digitized division, first digitized corps, and IBCT needs; supports the development of a HUMRAAM fire direction center capability on FAADC2; and implements full horizontal and vertical interoperability. Funding also initiates fielding of associated software capabilities. The PB02 funds the fielding of nine ARNG SHORAD units



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and two AC SHORAD units with an objective FAADC2 capability (Block III engagement operations and force operations software hosted on the Air and Missile Defense Workstation (AMDWS) CHS-2 and -3 workstations). PB02 funding initiates development of the Block IV software capabilities, such as tactical information broadcast service integration, tracking of EPLRS-equipped aircraft, and alternative data communications. Funding for additional FAADC2 for ARNG enhanced Separate Brigade (eSB) Air Defense Artillery (ADA) batteries and ARNG divisional battalions was sought but remains an unfinanced requirement in PB02.

#### **Air and Missile Defense Planning Control Station (AMDPCS)**



**Description.** AMDPCS fully automates C4ISR; integrates Air and Missile Defense (AMD) sensors, weapons, and C3I; and interfaces with ABCS, GCSS, and joint and allied C4I. This system gives the force air space situational understanding. It is employed at division through theater-levels and is C-130 deployable.

**Operational Requirement.** AMDPCS integrates and automates engagement/force operations at all echelons of command.

**Program Status.** The program is in the procurement cycle. The PB02 funds procurement of AMDPCS

configurations for the 32nd Army Air and Missile Defense Command (AAMDC) and AMD brigades and continued software development. The PB02 partially funds procurement necessary to upgrade and materiel release the currently fielded five brigade AMDPCSs and the 32nd AAMDC AMDPCS. It also begins to procure the 263<sup>rd</sup> AAMDC and 111<sup>th</sup> AMD brigade AMDPCSs and continues the development of AMDWS software versions 2.0 through 4.0 and Air Defense System Integrator (ADSI) versions 11.0 and 12.0.

#### **Global Combat Service Support-Army (GCSS-Army)**

**Description.** GCSS-Army is a business and tactical automation enabler for the total Army Combat Service Support (CSS) mission area. It supports the CSS functions of manning, arming, fixing, fueling, moving, and sustaining soldiers and their systems. It is the Army portion of the GCCS. GCSS-Army follows an incremental strategy combining development with fielding of capability packages.

**Operational requirement.** GCSS-Army supports joint, allied, and split-based operations, and provides near-real-time integrated CSS information on a single platform featuring horizontal/vertical integration of data across CSS domains. GCSS-Army will deliver tailored logistics packages and sustainment directly to the strategic, operational, and tactical levels of operations, fusing information, logistics, and transportation technologies. This directly contributes

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to the reduction of the logistics footprint.

**Program Status.** Milestone IIIA review is scheduled for 3QFY01. Development of all packages will be completed by 2QFY03 with fielding completed by 1QFY05.

**Combat Service Support Control System (CSSCS)**

**Description.** CSSCS is a decision support system that utilizes multiple sources of logistics data to better support the warfighter and battle management process. CSSCS provides a concise picture of unit requirements and support capabilities by collecting, processing, and displaying information on key items of supplies, services, and personnel that commanders deem crucial to the success of an operation.

**Operational Requirement.** CSSCS is the automated C2 system that provides the logistics component of the ABCS. By rapidly collecting, storing, analyzing, and disseminating essential logistics, medical, transportation, services, and personnel information, CSSCS assists both the tactical and the CSS commander. It will be fielded to the brigade level for combat and combat support units, and to the battalion level for CSS units.

**Program Status.** CSSCS received Milestone III approval for full-scale production in April 1997 and is currently fielded to III Corps, the 2nd Armored Cavalry Regiment and XVIII Corps to CSS battalion level. Version 4 software development to be completed

in FY01 provides enhanced capability and functionality.

**Transportation Corps Automated Information Management System (TCAIMS II)**



**Description.** TCAIMS II is a joint service migration system that provides an integrated set of transportation applications to facilitate movements and management of personnel, equipment, and supplies from home station to the conflict and back. It is a source feeder system to the Joint Operation Planning and Execution System (JOPEs), the Global Transportation Network (GTN), and transportation component commands for common user lift.

**Operational Requirement.** TCAIMS II enables rapid deployment, planning, and execution. The warfighter gets hands-on capabilities for planning and executing unit moves, asset management, and an enabler for in-transit visibility and C2.

**Program Status.** The system has completed the Army Test and Evaluation Command (ATEC) customer test for each of the armed services. It is being utilized in the Joint Chiefs of Staff (JCS) Millennium Challenge Exercise, and there is a prototype operational in U.S. Army Europe (USAREUR).

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## **Advanced Field Artillery Tactical Data System (AFATDS)**

**Description.** The AFATDS is a U.S. Army and U.S. Marine Corps automated C2 system for fire support operations. It provides the singular command, control, and communications (C3) solution to the complex problem of integrating, coordinating, and controlling all fire support assets.

**Operational Requirement.** AFATDS is deployed to all levels from field artillery firing platoon level through echelons above corps in both the Active and Reserve Components. AFATDS provides the fires portion of the ABCS and interfaces with joint and allied fires and C2 systems. A key element of the combined-arms force, AFATDS coordinates employment of aircraft and land- and sea-based indirect fire systems to support maneuver operations. AFATDS analyzes available fire support assets and applies commander's guidance to attack targets based on an optimal fire support solution. AFATDS replaces the Initial Fire Support Automated System (IFSAS) and will eventually replace the Battery Computer System (BCS) in cannon units and the Fire Direction System (FDS) in rocket/missile units.

### **Program Status.**

AFATDS received its Materiel Release Decision in FY96, and is currently in the procurement and fielding phase. AFATDS software will be upgraded through periodic software releases.



The improved capabilities of AFATDS, the Forward Entry Device (FED), and other fire support systems that contribute to the maintenance of information dominance during the near- and midterms. However, AFATDS will not meet the requirements of the Army after 2010. A draft AFATDS Operational Requirements Document (ORD) specifies requirements for the long-term, identifying requirements for an effects-based system. An effects-based system will have the capability to establish, alter or terminate sensor-to-shooter links in seconds without lengthy coordination, and will have visibility and management authority over all fires assets without regard to source—including air, naval, and space systems. The planned Effects Control System (ECS) program will meet those requirements. ECS program funds begin in FY08. A funding gap between the last version of AFATDS and the beginning of ECS will be addressed during the budgeting process.

## **Assessment**

The Command, Control, and Signal Systems functional area comprises joint and Army command, control, and communications systems, which require a seamless infrastructure for the dissemination of information. These systems provide the TI, both local and long-distance telephone calls, desktop computing, and data exchange services for the deployed/tactical Army element. As the requirements for our force changed to enhanced mobility, deployability, and information superiority, they validated our planned modernization of the command, control, and communications

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infrastructure. We must continue the maintenance, selected upgrade, and modernization of our legacy systems. In most cases, these legacy systems will transition to the Objective Force. The others will require resources to maintain our current capabilities of combat overmatch until units are fielded with modernized equipment.

Command, Control, and Signal Systems support the Army Transformation. Selected upgrades are being applied to most legacy systems to ensure relevance for

today's requirements. However, funding priority remains with systems for the Objective Force. The level of funding for the information infrastructure must remain consistent with the combat systems it supports. Technology will allow us to transform and support the requirements of a strategically responsive force. In addition, the programs within the Command, Control, and Signal Systems serve as the spearhead for interoperability and commonality throughout the Army, joint, and allied forces.

## **Intelligence and Electronic Warfare (IEW)**

### **Overview**

Army Military Intelligence provides commanders, operators, and other consumers specific, relevant, timely, and accurate information and finished intelligence in any format they request. Army Military Intelligence is the “eyes” and “ears” of the commander and the Army.

There are four IEW core competencies—collection; Intelligence, Surveillance and Reconnaissance (ISR) integration; analysis; and presentation—that enable the commander to employ combat capability more effectively and faster than the enemy. The effective use of intelligence allows commanders to defeat the enemy before they can conduct operations on their terms. Fundamental to success of the IEW functional area is analysis at the point of decision across the operational spectrum and at all echelons. Additionally, intelligence must be fully integrated into the near fight as well as deep operations. This dictates that

some intelligence capability must always be forward with the warfighter.

At the same time technology provides us the means to minimize our footprint forward, the increasing complexity of operations dictates that no one echelon can do it all. Therefore, the IEW functional area will rely heavily on reachback and collaborative operations. Split-based, distributed operations will become the standard in all future IEW efforts. Force deployability and force protection, to include Information Operations (IO) and Measurement and Signature Intelligence (MASINT), dictate that we embrace these concepts and

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incorporate them into our modernization efforts.

Finally, the mission essential tasks of intelligence—Intelligence Preparation of the Battlefield (IPB), situational awareness, target development, support to force protection, indications and warnings, and battle damage/combat assessment—are as valid in the Objective Force as they are today. Only the complexity and requirement to operate simultaneously on multiple parts of the operational spectrum will change. The IEW force of the future will be better able to provide these capabilities to the commander.

## **IEW Modernization in Support of Transformation**

### **Overview**

The Army faces a major challenge with regard to its current and future intelligence, surveillance, reconnaissance, and targeting support (ISRT) ground-processing and analysis architecture. Of fundamental concern is satisfying the commander's need for unambiguous, concise, accurate, and timely information; and achieving this in a strategic and operational environment that requires the rapid deployment of forces in response to crises. For Army Intelligence, this mandates a fundamental change in the approach to single-source, multi-source, and all-source intelligence. The current architecture of multiple ISRT ground processing systems, each aligned with either a specific intelligence discipline or a specific collector, is no longer operationally or economically viable. While each of the

current systems addresses a validated need, when viewed collectively as a comprehensive architecture or system, they do not achieve the integrated/network-centric solution needed to achieve information dominance for current and future Army and joint warfighters. In fact, when operating as a family-of-systems, these systems can build a confusing picture of the battlespace, due to interoperability failures and overlapping time- and location-based analysis. The focus must be on the common processing capabilities required for the Intelligence and Electronic Warfare (IEW) Battlefield Functional Area (BFA) to improve its operational contribution. Likewise, IEW must reduce its footprint and logistical requirement by migrating toward smaller, more deployable, more capable, multiple intelligence (multi-INT) elements, consistent with Army Transformation.

IEW systems are an integral part of each phase of Transformation. At any given time during the Transformation, the IEW functional area will have legacy, interim, and objective systems in the field. Legacy systems such as GUARDRAIL Common Sensor (GRCS), Airborne Reconnaissance Low (ARL), and Joint Surveillance Target Attack Radar System (JSTARS) Common Ground Station (CGS) will be sustained and provided upgrades to guarantee maintenance of critical warfighting readiness. Systems are being fielded to the Interim Force to fill near-term capability gaps that exist today. Interim systems fall into two categories: (1) systems such as the Hunter Unmanned Aerial Vehicle (UAV) and Ground Surveillance Radars (GSR) that will be replaced as soon as



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new capabilities are fielded and (2) legacy-to-objective systems such as the All Source Analysis System (ASAS) that will go through a spiral development process with block upgrades until they reach the Objective Force. The only IEW system that is solely an objective system is Aerial Common Sensor (ACS) that is in the early stages of research and development.

Today's highly intensive levels of employment for Army forces and the postulated increase in peacekeeping missions and other vital noncombat uses require that robust and multi-capable IEW capabilities be maintained during transitions. Therefore, an incremental or migration approach leading to a fully capable objective system is required. The migration plan must modernize some existing systems and develop new systems where existing systems will not suffice.

The transformed intelligence system of systems enables the commander to take advantage of supporting intelligence collection, production, and dissemination conducted at all echelons. As an example of the economies that will be achieved in this Transformation, the current corps and EAC airborne Signals Intelligence (SIGINT) collection mission currently performed by two systems, GUARDRAIL Common Sensor (GRCS) and ARL, will in the Objective Force be performed by one system, ACS. The same consolidation of missions is taking place at the division level as we migrate numerous SIGINT and electronic attack systems into a common platform, Prophet. This is a

significant step forward in meeting our task of providing SIGINT in support of wide area surveillance and force protection to the division and brigade commanders.

Additionally, our current suite of tactical systems that exploit national capabilities includes several platforms at the corps and division levels that provide SIGINT and Imagery Intelligence (IMINT). With the fielding of the Tactical Exploitation System (TES) and the Division Tactical Exploitation System (DTES), the same essential information processing will be accomplished with a significantly reduced number of vehicles. This not only improves deployability and reduces in-theater footprint, but it also allows for a more tailorable capability to provide the same access to information in all situations across the spectrum of conflict.

The Army is taking MASINT from a scientific and technical focus to bringing those capabilities (e.g., hyperspectral, overhead non-imaging infrared, derived products from Synthetic Aperture Radar (SAR)) to the fight in support of all-source intelligence. Specifically, we are currently conducting a MASINT Integrated Product Team (IPT). The IPT is validating requirements for integration of MASINT capability into legacy (ARL-Multifunction) and objective IEW systems (Tactical UAV (TUAV), ACS, Prophet, Distributed Common Ground System-Army (DCGS-A) and ASAS).

We are continuing to develop a Computer Network Exploitation (CNE) capability to support Computer

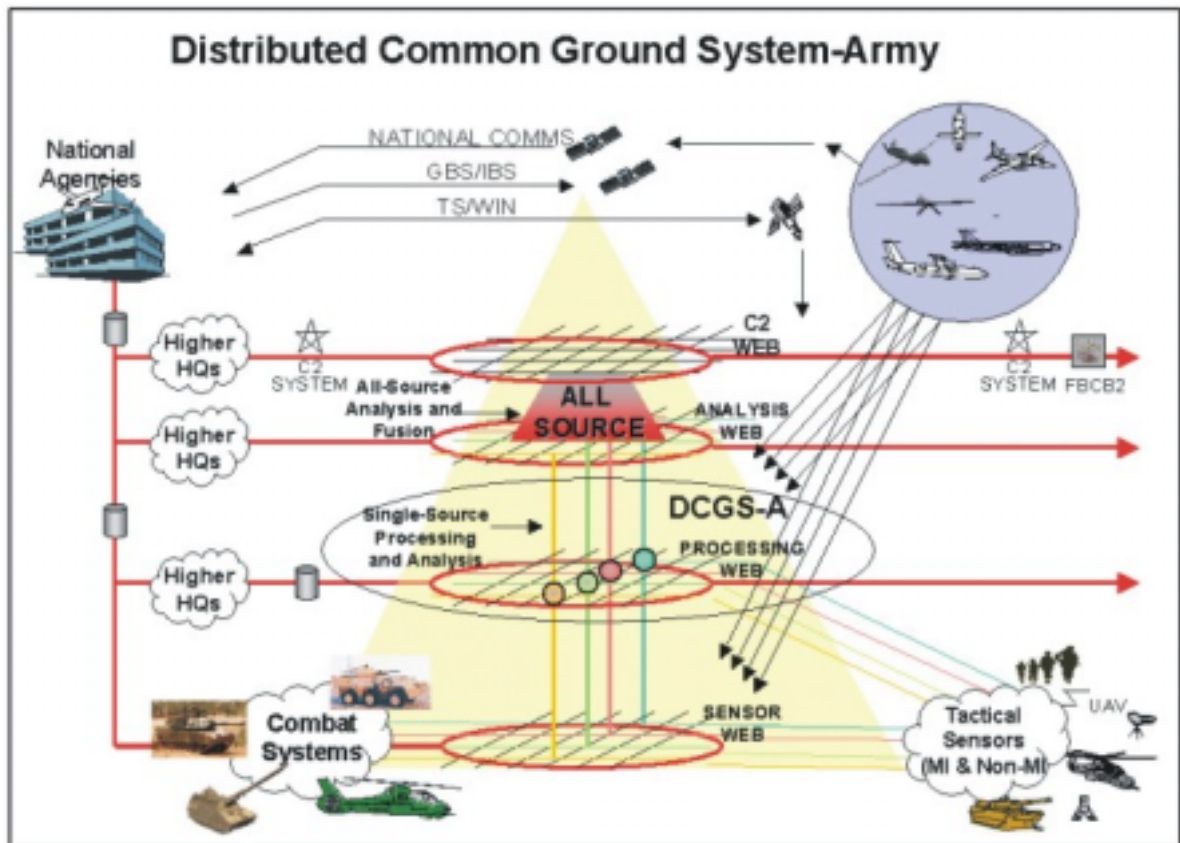
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Network Attack (CAN) and intelligence support to Computer Network Defense (CND). Information dominance funding allows tactical forces to leverage existing and emerging communications and data mining technology to tie together analytical expertise with Army, joint, and national databases to support the commander.

The most significant initiative that will occur in the transformation of the IEW functional area is the developmental effort that will begin with the DCGS-A architecture. DCGS-A is a multi-INT, interoperable ISRT family-of-systems infrastructure. It provides combat commanders concise, accurate, and timely data, information, single, multi-source, and all-source intelligence that is unambiguous. The objective is to provide this in a format, preferably digital, which can be easily understood and used for operational decision making without further detailed analysis. The tenets are dynamic, sensor/collector access, robust processing in a small footprint, tactical, wheeled, vehicle-mounted, operating in a split-based concept, capable of linking to purpose-built systems (both IEW and non-IEW), and able to dynamically build profiles and alerts to assist the analyst in detecting and reporting critical events. This family-of-systems is constructed with modular and scaleable components that range from fixed-based to stand-alone workstations.

The Army envisions developing DCGS-A in three phases. The initial phase is on going. Its focus is on achieving interoperability at the message-format level. This phase will be completed by FY00. The second

phase runs concurrent with the initial phase and begins the migration of current systems to achieve an interim capability. This capability will be based on the movement towards common components of these IEW elements and increased database interoperability. Additionally, the Army will develop the DCGS-A transition architecture through an evolutionary merging of existing and programmed ground station elements (GUARDRAIL Integrated Processing Facility, TES, CGS, TUAV Ground Control Station/Tactical Control System (GCS/TCS), Prophet Control, etc.) and the procurement of new component capabilities as required. The planned completion date for Phase 2 is FY07. The final phase achieves the objective architecture. The anticipated completion date is FY15. The objective architecture envisions a ubiquitous form of internetting and a network-centric concept of operations with truly common components that are scaleable and modular. This type of architecture enhances real-time delivery of information to the warfighters. It enables the warfighter to become the "front-end" of the architecture. The architecture leverages commercial and coalition products and services and injects new capabilities, allowing rapid reconfiguration without major expenditures. All architecture components will comply with Service, joint, and national interoperability standards. Components of the DCGS-A architecture will exist at each echelon from battalion to EAC. The DCGS-A concept is depicted in the following figure.



### IEW Modernization Priorities

The top priority for IEW modernization is the migration to the DCGS-A to the system-of-systems construct. DCGS-A will be developed and seamlessly integrated with the ASAS; together, they represent the tasking, processing, exploitation, and dissemination (TPED) architecture for the Army at every echelon. The Army's TUAV program is a close second to DCGS-A. It will provide dedicated and responsive targeting information to the maneuver brigade commander. The development of additional sensor payloads and extended range and loiter time will enhance location and identification of targets in support of deep fires and precision operations. The TUAV program will evolve into the Army's multi-INT, unmanned aerial platform.

Next in priority is the Army's ACS program. This is the Army's only purely objective system and is in the early stages of R&D. ACS will be the Army commander's multi-INT, manned aerial platform. The Counterintelligence/Human Intelligence Information Management System (CHIMS) that provides CI/HUMINT soldiers with automated support for the collection, analysis, and dissemination of HUMINT and CI information is also high on the list of priority systems. CHIMS is the CI/HUMINT source for DCGS-A and the IEW subelement of the ABCS. Critical for Army transformation is the Prophet system. Prophet is currently the division commanders' ground-based SIGINT collector, but it will evolve into the Army's multi-INT, ground-based platform. Last in priority, but critical for

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IPB is the Integrated Meteorological System (IMETS). IMETS receives, processes, and collates forecast, observations, and climatological data to produce timely and accurate analysis of the impact of current and projected weather conditions on both friendly and enemy personnel and weapon systems.

The other IEW systems listed are being fielded to the Legacy Force and will transition to the Objective Force as block improvements are made to the system. The legacy to objective systems will be fielded to the IBCTs as well as surrogate systems such as Hunter UAV, GSRs, and remote sensor devices until the objective systems are able to replace them. The Legacy Force systems will be funded so that they remain viable, but additional improvements will be limited.

### **Discussion of equipment**

The following legacy systems are currently being fielded and are being built to threshold requirements only with minimal upgrades to maintain relevance against the threat or safety of flight issues. The resources saved from this strategy are being committed to legacy systems that will migrate to the Objective Force or in the research and development of the ACS.

#### **JSTARS Common Ground Station (CGS)**

**Description.** JSTARS is a joint Army/Air Force program. The airborne platform has a multimode radar capable of wide-area surveillance and synthetic aperture modes. A Surveillance and Control Data Link

(SCDL) provides secure communications. Orbiting a safe distance from the Forward Line of Troops (FLOT), the radar scans a wide area of the battlefield. The radar data is received by Army and Air Force operators aboard the aircraft and then downlinked to multiple CGSs via the SCDL. CGS will become the brigade DCGS-A element.



**Operational Requirement.** Army CGS is a mobile, tactical, multisensor ground station that receives, displays, processes, and disseminates, in near-real-time, targeting and intelligence information to all echelons. The system can detect, locate, track, classify, and assist in attacking both fixed and moving targets beyond the FLOT, during daylight and darkness, and in nearly all weather conditions. In addition to receiving Joint STARS radar data, the CGS is capable of receiving and displaying UAV imagery as well as signals intelligence data via an integrated Joint Tactical Terminal (JTT).

**Program Status.** A total of 79 Low-Rate Initial Production (LRIP) platforms have been procured. An Acquisition Decision Memorandum (ADM), signed in August 2000, authorized the Army to proceed to CGS Full Rate Production (FRP) for the remaining 21 systems to



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meet the APO of 100 (96 CGS and four JSTARS workstations). The program will become a component of the ACGS-A.

### **GUARDRAIL Common Sensor (GRCS)**

**Description.** GRCS (RC-12) is a corps-level, fixed-wing SIGINT collection and target location system that supports the EAC, corps, division, and Joint Force Land Component Commander (JFLCC) by detecting, identifying, exploiting, and precisely locating threat radios, radars, and other electronic emitters throughout the area of interest. GRCS includes an Integrated Processing Facility (IPF) for ground processing, and an interoperable datalink connects airborne and ground processing elements. GRCS supports split-based/extended range operations via direct satellite relay and is interoperable with U.S. Air Force COMINT systems.



**Operational Requirement.** GRCS provides signals intercept and precision target location of threat communications and noncommunications emitters. This multidiscipline intelligence collection system satisfies the Army's critical need for a worldwide, self-deployable, airborne, reconnaissance, intelligence, surveillance, and target acquisition capability.

**Program Status.** Planned upgrades for GRCS will be limited to flight safety requirements and maintaining relevance to threat and interoperability issues. The air platforms will migrate to the ACS in the Objective Force. The IPF will be replaced by a component of the DCGS-A in the near term and move to the Objective Force.

### **Airborne Reconnaissance Low (ARL)**

**Description.** ARL consists of a modified DeHavilland DHC-7 fixed-wing aircraft equipped with Communications Intelligence (COMINT), IMINT, and Moving Target Indicator (MTI)/SAR mission payloads. ARL is a multifunction, day/night, all-weather reconnaissance and intelligence asset that is self-deployable/self-sustaining (7-10 days). It has an endurance of eight hours and a ceiling of 25,000 ft. The ARL range with maximum payload is greater than 1,400nm.



**Operational Requirement.** ARL is an EAC-level asset that provides the ability to detect, locate, and report threat activities using a variety of imagery, communications intercept, and MTI sensor payloads. The low profile allows ARL to deploy to host countries. ARL provides counter-drug and counterinsurgency support to CINC Southern Command (CINCSOUTH) and daily reconnaissance/ surveillance for CINC Pacific Command/U.S. Forces Korea (CINCPAC/USFK); it assists the



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Federal Emergency Management Agency (FEMA) with imagery of disaster areas and supports other non-DoD agencies.

**Program Status.** One ARL-Multifunction (ARL-M) just completed production and is currently being fielded (FY01). Congress provided \$30 million in FY00 for a replacement aircraft for a system lost in a SOUTHCOM crash. It will be fielded in the FY03/04 timeframe. The retrofit of two aircraft to the multifunction configuration will be completed in FY02. Limited upgrades are being performed to maintain relevancy until the objective ACS platform is fielded. Most of the IEW equipment currently being fielded will transition to the Objective Force. A deliberate plan of block improvements, spiral development, and modular technology allows IEW systems to evolve to the Objective Force. IEW systems will increase in capabilities as block improvements are integrated. Capabilities being fielded today represent only threshold requirements in the Objective Force.

### **The Tactical Unmanned Aerial Vehicle (TUAV)**

**Description.** Each TUAV system consists of three UAVs, two GCSs, one portable GCS, and four remote video terminals that can provide near-real-time video to commanders on the ground. The UAVs currently have an on-board electro-optic (EO)/infrared (IR) sensor payload. The threshold range is 50km with an objective range of 200km and an on-station endurance of four hours. The threshold payload is 60lbs with an objective capacity of

100lbs. OPTEMPO requirements a threshold of 12 per 24-hours and an objective of 18 per 24 hours.



**Operational Requirement.** The TUAV is the ground maneuver commander's primary day/night Reconnaissance, Surveillance, and Target Acquisition (RSTA) system. It provides the commander with enhanced situational awareness, target acquisition, battle damage assessment, and enhanced battle management capabilities.

**Program Status.** A production contract was awarded in December 1999 with four LRIP systems delivered for Initial Operational Test and Evaluation (IOT&E) in FY01. The Army Acquisition Executive will decide in February 2001 whether to pursue a second LRIP purchase of four systems. First unit equipped is set for April 2001. The Initial Operational Capability will be in June FY02. The program was accelerated by two years in the FY02-07 Plan. The program is fully funded to procure the Army Acquisition Objective of 44 systems.

### **Tactical Exploitation System (TES)**

**Description.** TES Main and Forward replaces the Advanced Electronic Processing and Dissemination System (AEPDS), the Enhanced Tactical Radar Correlator (ETRAC), and the Modernized Imagery Exploitation



System (MIES). It combines the functionality of three separate systems into a single, integrated, scalable system designed for split-based operations. TES consists of Forward and Main elements. The TES Forward is a highly mobile, HMMWV-mounted element, and the TES Main is housed in vans. Each element has similar operational, communications, and support capabilities. TES is designed to provide the commander maximum flexibility to satisfy intelligence needs in a wide range of operational scenarios. TES provides multiple configurations, ranging from a one C-130 deployable HMMWV early-entry capability to collocated Main and Forward elements with up to 40 operator workstations. TES operators can perform an imagery intelligence, SIGINT, cross-intelligence (Cross-INT), or dissemination function from any system workstation. TES processes data from U-2, Global Hawk, Predator, F/A-18, and national systems. It can provide sensor and platform control of the U-2, and interoperates with the GUARDRAIL IPF. The Division TES (DTES) replaces the Mobile Integrated Tactical Terminal (MITT) at division. The DTES is composed of two HMMWV-mounted shelters providing robust RF and terrestrial communications capabilities, Generic Area Limitation Environment (GALE) for SIGINT analysis, secondary imagery

dissemination functionality, and a Cross-INT capability. It can be transported on a single C-130.

**Operational Requirement.** TES serves as the interface between national systems and in-theater tactical forces. Additionally, it receives data directly from selected theater sensor systems. TES will become the DCGS-A element at EAC, corps, and division.

**Program Status.** TES Main and TES Forward were fielded to XVIII Airborne Corps in FY00. Two additional TES Mains (513th Military Intelligence and V Corps) and one Forward (513th Military Intelligence) will be fielded in FY01. One TES Forward will be fielded in FY02. TES will migrate to ACGS-A in the near term. All Army divisions are scheduled to receive the DTES. Fielding began in FY01 with the first DTES delivered to the 82nd Airborne Division. The remaining systems will be delivered over the next four years with the last delivered to the 25th ID in late FY05.

### **The All Source Analysis System (ASAS)**

**Description.** ASAS comprises three components: the Analysis and Control Element (ACE), the Remote Workstation (RWS), and the Analysis and Control Team-Enclave (ACT-E).



The ASAS ACE is the intelligence analyst's primary tool for fusing the intelligence that is collected from multiple sources and then passed to the warfighter. It disseminates the fused intelligence picture to the warfighter via

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the RWS. It is located at the corps/division operations centers, EAC intelligence centers, and at Army staffs throughout a theater/joint command. The RWS is the warfighter's primary collateral intelligence source. It operates primarily in a collateral environment down to the brigade level. A laptop version, ASAS-Light, operates at the battalion level. The maneuver brigade commander is also provided additional intelligence support via the ACT-E, a vehicle-mounted shelter containing two RWSs with integrated communications and LAN access capability.

**Operational Requirement.** ASAS is the IEW component of ABCS supporting the warfighter from theater to battalion. In a networked environment, it automates IEW asset management, conducts target nomination, and fuses inputs from multiple intelligence sources to develop the threat picture for the commander's overall situational awareness. This results in a timely, accurate, and common relevant picture throughout all echelons on the battlefield.

**Program Status.** ASAS Block II is in EMD with several components in FRP. The RWS, ACT-E, and ASAS-Light have completed operational testing, and fielding began in FY99, FY00, and FY01, respectively. The ASAS ACE will complete operational test in FY03, with fielding to start in FY04. The ASAS Block III development will start in FY04.

### **Prophet**

**Description.** Prophet provides expanded frequency and area SIGINT

coverage of the battlefield for situational development and awareness and force protection operations. Prophet will support on-the-move and dismounted operations. Programmed block improvements include electronic attack, advanced signals, and MASINT capabilities. Prophet replaces three more costly legacy systems. Prophet gives the commander a dedicated, dynamically retaskable asset. Prophet allows the tactical



commander to visually depict and understand his battlespace and gain situational awareness on the battlefield of the future.

**Operational Requirement.** Prophet provides actionable intelligence (SIGINT/MASINT), in support of IBCT and brigade commanders throughout the entire spectrum of operations. It gives the commander a comprehensive picture of electronic emitters in his battlespace and provides the ability to collect, locate, and electronically attack selected emitters.

**Program Status.** Prophet Block I passed IOT&E in November FY00, completed Milestone III in March FY01, and has entered FRP, with initial fielding scheduled for 4QFY02. The Prophet Air program has been restructured as the Division TUAV SIGINT Payload (DTSP). DTSP will provide enhanced situational awareness to the division commander by electronic mapping of threat

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emitters. DTSP is currently in the Concept Exploration Phase with an expected FUE of FY09.

### **Integrated Meteorological System (IMETS)**



**Description.** IMETS comes in three configurations: vehicle-mounted for division/corps command posts and aviation brigades; desktop version for theater command posts; and laptop version for Special Operations Forces (SOF) and aviation battalions. The IMETS-Light is being fielded to the IBCT. The Air Force Combat Weather Team, attached to Army units, operates the system. It receives weather information from civilian and defense meteorological satellites, Air Force Global Weather Central (AFGWC), artillery meteorological and remote sensors, and civilian forecast centers. IMETS processes and collates forecasts, observations, and climatological data to produce timely and accurate weather products tailored to the specific warfighter's needs. The weather effects graphics display the impact of the weather on current or planned operations for both friendly and enemy forces, allowing the warfighter to more effectively employ his forces and weapon systems to achieve success in battle.

**Operational Requirement.** IMETS provides commanders at all echelons

with an automated weather system that receives, processes, and disseminates weather observations, and forecasts, and provides environmental effects decision aids to all battlefield operating systems.

**Program Status.** The vehicle-mounted version is in FRP with 27 systems fielded by the end of FY01. The IMETS-Light and Command Post versions are in EMD with testing and fielding planned for FY02.

### **Joint Tactical Terminal (JTT) and Common Integrated Broadcast Service Modules (CIBS-M)**



**Description.** JTT provides the critical data link to battle managers, intelligence centers, air defense, fire support, and aviation nodes across all Services. It links the intelligence systems of Army C2, GRCS, ARL, TES, the U.S. Air Force's U-2 and RIVET JOINT aircraft, and the U.S. Navy's EP3 aircraft. JTT allows Army, Air Force, Navy, and Marine Corps users to exploit intelligence broadcast networks. In addition to receiving Intelligence data, JTT performs a data relay function. JTT is provided for integration into systems on vehicles, aircraft, ships, and fixed sites, and is DoD's single objective Integrated Broadcast Service (IBS) tactical terminal. JTT will migrate to CIBS-M in the midterm. Migration will build on



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proven capabilities and establish joint standards to maximize both interoperability and efficiency. JTT-Briefcase is being developed for the SOF community and others to provide a lightweight, fully integrated, stand-alone system capable of receiving data from the current legacy broadcasts and the future IBS.

**Operational Requirement.** The JTT/CIBS-M provides the joint warfighter with seamless, near-real-time access to tactical intelligence, targeting information, and situational awareness.

**Program Status.** JTT/CIBS-M is in LRIP. The system will be integrated into Army, Air Force, Navy, and Marine Corps host platforms as well as platforms supporting a variety of other DoD agencies. JTT Milestone III scheduled for FY01.

### **Aerial Common Sensor (ACS)**

**Description.** ACS is a critical Objective Force corps and EAC system that satisfies the Army's need for a worldwide, self-deployable airborne ISR asset that can begin operations upon arrival into theater. The ACS ground processing facility will be an integral part of the DCGS-A architecture. The wide-area surveillance and precision targeting data will allow support to targeting and provide commanders at every echelon the tailored intelligence they require. The air platform has not been selected; however, sensor payloads will include COMINT, ELINT, IMINT, and MASINT to include EO, IR, SAR, MTI, multi- and hyperspectral imagery sensors. Intelligence products are distributed to

other consumers using the JTT via the IBS and the GBS.

**Operational Requirement.** ACS is the objective airborne multidiscipline intelligence platform for corps and EAC military intelligence brigades. ACS will merge the capabilities of GRCS and ARL into a multifunctional system (SIGINT, IMINT and MASINT). ACS will provide the precision-targeting data needed by future deep-strike weapon systems and the Objective Force. ACS will support early-entry operations and forward-deployed forces by providing timely indications and warning, dominant situational awareness, battle management, and precision targeting capabilities across the full spectrum of operations.

**Program Status.** An Analysis of Alternatives is ongoing to determine the best means of meeting the ACS requirement, and is scheduled for completion in FY01. ACS is currently in the concept exploration phase. The Component Advanced Development (CAD) is scheduled for 1QFY02, with Milestone B scheduled for 3QFY03. IOT&E and Milestone C are scheduled for FY07. FUE is scheduled for FY09.

### **Assessment**

IEW supports the Army's Transformation strategy by integrating national, joint, theater, and other Service systems into a seamless system of systems to maintain combat overmatch in the near term, while supporting the requirements for the Objective Force in the far term. Selected upgrades are being applied to legacy systems to maintain relevancy, but funding priority remains with



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Objective Force systems. Systems being fielded to the Interim Force as surrogate systems such as Hunter, ground surveillance radars, and remote sensors will fill a void until replaced by objective systems. As we migrate to more technologically advanced collection, processing and dissemination capabilities, we will also take advantage of the technology that allows us to do that with fewer systems in the theater of operations. This not only reduces in-theater footprint, but also makes the commander's organic intelligence suite more deployable and mobile once in theater. Most importantly, the improved capabilities that will result from this transition will empower the combat commander to visualize his battlespace, make timely decisions, and use his available combat power as effectively as possible. While this section focuses on requirements and capabilities that are specifically found in IEW, the comprehensive intelligence and combat information structure includes scouts, reconnaissance helicopters, air defense and artillery radar systems, and Army SOF with organic collection and processing capabilities. The coordinated and synchronized efforts of all these assets will provide the tactical commander with the knowledge he needs to defeat the enemy.

The IEW modernization strategy will support Army Transformation in accordance with requisite timelines. Timely, accurate, and focused intelligence will contribute directly to the increased lethality and survivability required for full spectrum operations. Legacy systems will be maintained until they are replaced by objective systems. New systems will be fielded

to the Legacy and Interim Forces and be upgraded and improved as technology allows. R&D funding for objective systems will also continue to be one of our top priorities. The IEW modernization strategy supports the Transformation of the Army into a responsive force able to operate efficiently in contingencies that range from humanitarian assistance to a major theater conflict.

## **Engineer Component**

### **Overview**

In the challenging and complex environment of the 21st century, the Army will continue to place emphasis on the ability to have information superiority over the threat. Engineer assets provide key enablers to accomplish this task. To support information superiority for the joint force, Engineers seek to capitalize on the insertion of technologies that enhance the information superiority of the force. The Maneuver Control System-Engineer (MCS-Eng) will provide a capability to insert engineer-specific realities into the Army's Maneuver Control System (MCS) while providing engineers all necessary maneuver data. Tele-Engineering Operations will operate on common C2 architecture and provide rapid solutions to the deployed forces from a nondeployed consolidated knowledge base. As the Army leaves the Industrial Age and enters the Information Age, both MCS and MCS-Eng directly support Transformation.

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## Discussion of Equipment

### **Maneuver Control System-Engineer (MCS-Eng)**

**Description.** MCS-Eng is an Engineer mission planning and rehearsal C2 system, which provides the maneuver commander and his staff (corps and below) with automated assistance to execute precise, near-real-time C2 of combat forces. MCS-Eng will be an engineer-specific software system subordinate to the MCS. It is software that will reside on MCS version 7.XX. MCS-Eng will operate on the Army Tactical Command and Control System (ATCCS) common hardware, provide engineer information to MCS via the Joint Common Database, and allow engineer access to maneuver data.



**Operational Requirement.** The system will provide automated C2 to Engineer staffs and commanders.

**Program Status.** In the RDT&E phase, a resulting engineer module will be integrated into the Army's MCS.

### **Tele-Engineering Operations**

**Description.** The overarching concept for Tele-Engineering is the exploitation of the Army's C3 architectures to provide a linkage between engineers and the appropriate nondeployed

subject matter experts (SMEs) for resolution of engineer challenges. This exploitation will allow Engineer SMEs to evaluate the problem, engage in dialogue with the deployed commands performing the work, and provide solutions to the problem. Solutions to the problems being addressed will exploit state-of-the-art technologies from the Army R&D community, SMEs within the Training and Doctrine Command (TRADOC) community, DoD high performance computing assets, the expertise of U.S. Army Corps of Engineers districts and divisions, private sector construction industry experience, and the knowledge base of academia.

**Operational Requirement.** The system will provide rapid solutions to the DoD in support of all engineer mission requirements using C2 architecture and existing communication systems.

**Program Status.** The U.S. Army Engineer Research and Development Center (ERDC) is currently developing and demonstrating under the proponentry of the U.S. Army Maneuver Support Center (MANSCEN).

## **Assessment**

Engineer-specific IS systems support the Army's Transformation strategy by supporting the Legacy, Interim and Objective Forces. The MCS-Eng is a fully functional component of the MCS family that inserts Information Age technology into the Legacy and Interim Forces. It will be fielded with Objective Force capability. Like the Digital Topographic Support System

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(Dominant Maneuver) the MCS-Eng provides the maneuver commander with the terrain and geospatial engineering information needed to fight and win on tomorrow's battlefield. Tele-Engineering Operations is an operational reality today. This

technology uses standard communications technologies to bring Engineer subject matter expertise to the battlefield. Both of these technologies are relatively inexpensive, easy to incorporate, and invaluable when needed.

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## ANNEX F: SPACE

### General

To support the ongoing Transformation process, the Army has revised its overall modernization strategy into a focused effort devoted to achieving essential capabilities for the future while, at the same time, providing the greatest capability possible for the current force. Modernization of space is required to meet the needs of both current and future forces.

Achieving the information superiority underpinning of ***Joint Vision 2020*** (*JV 2020*) and the lighter, faster, more lethal force of the Objective Force era will depend, to an even larger extent, upon the modernization of space-based capabilities. Today, space capabilities make unique and essential contributions to land force command and control, communications, intelligence, surveillance, reconnaissance, missile warning, weather, terrain and environmental monitoring, and navigational and timing support. Unfortunately, as these enhanced capabilities are achieved, our vulnerability is also increased. To ensure access to space and space capabilities, space control is taking on increased significance for land forces, driven in part by the rapid growth in commercial and international space capabilities. In the far-term, these concerns may expand to include modernization related to force application from space.

Because space capabilities are inherently joint and are spread over

several Army battlefield operating systems, space capabilities support all the enhanced operational concepts of *JV 2020*. As a result, the overall, synergistic benefit of space capabilities is not always readily apparent. This diversity also means that modernization of space programs is a challenge to coordinate. To assist in this process, the Army has designated Army Space and Missile Defense Command (SMDC) as the specified proponent for space and the integrator of space activities for the Army. Full integration of space capabilities in land force operations is essential to achieving the Army's Transformation objective. To this end, the Army has embedded a Space Operations Cell (SOC) into the Interim Division design, and SMDC will advocate its inclusion in the Corps redesign. Consisting of Functional Area (FA 40) Space Operations Officers and enlisted support personnel, the SOC will enable ground component commanders to fully exploit space system capabilities by bringing the specialized space operational expertise to bear in the planning and execution of land operations.

The systems that provide space capabilities to the warfighter have modernization programs to ensure the readiness of the Legacy and Interim Forces and to ensure meeting the demands of the Objective Force. Army operational capabilities are often assessed along functional or battlefield operating system lines. Not a traditional operating system in its own right, space significantly enables

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many traditional military functions. Without going into system details, this annex touches on a variety of space-related systems to give readers a broad view of how Army space modernization contributes to the future success of land component forces. Three perspectives are given—first

through the lens of the five *JV 2020* operational concepts, then from a functional area perspective, and finally through the space modernization programs themselves. The annex concludes with an assessment of the overall status of space modernization in the Army.

## Army Space Overview

Through robust beyond line-of-sight (BLOS) connectivity and its ultimate high-ground perspective, space systems provide warfighters near- and real-time situational awareness of force composition and disposition, detailed knowledge of battlespace and associated environment, the status of support and sustainment efforts, and the linkages military leaders require to plan and execute dynamic military operations.

Space capabilities cannot be viewed as “nice to have.” From an Army warfighter perspective, space came into it’s “tactical own” during Desert Shield/Desert Storm and remains a key enabler for warfighters today. Space capabilities will steadily become even more mission-critical as the Interim Force takes shape and the Army begins to transform ultimately into the Objective Force. Space provides, and will continue to provide, perhaps the Army’s most important combat multiplier. Space systems, including their ground segments, enhance Army capabilities in Command, Control and BLOS communications; Intelligence, Surveillance, and Reconnaissance (ISR); Position, Navigation, and Timing (PNT); Weather, Terrain, and Environmental Monitoring (WTEM); and Missile Warning (MW). Because these functional capabilities are so critical to the warfighter, we must also expand and enhance space control capabilities that will assure our access

to space and deny that access to our adversaries. Collectively, these space capabilities are a key enabler for achieving the Objective Force characteristics articulated in the Army Vision. Space capabilities are essential for accomplishment of the Transformation objective.

The Army’s evolving space operations Warfighting Concept recognizes the importance of space capabilities to land force operations. It describes the future battlespace as a “seamless, vertical continuum” and recognizes that the land force commander must have direct access to space capabilities and control over the effects of space-based platforms. The concept also recognizes the interdependence of space systems and land force operations by articulating the requirement for mutual support. The Army’s approach to this goal is through the full and seamless integration of space and land force operations. Modernization of space systems that provide enhanced



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operational capabilities must be synchronized with modernization of other Army systems and forces and with joint space capabilities.

## **Space Modernization in Support of JV 2020**

### **Planning**

The traditional emphasis for Army space capabilities has been on ground terminal development. There will be a continuing effort to field enhanced ground-based terminals and receivers, and to ensure they are upgraded to keep pace with improvements to space-based sensors and communications systems. However, Army space modernization interests also include other segments of space architectures and systems. There are increasing Army efforts to identify and leverage joint, commercial, civil, and allied space opportunities with operational and tactical warfighting potential. The Army has also increased participation in the design of joint and national space systems and architectures. The emphasis here is on developing and integrating Army requirements to ensure that joint and national systems support the mission needs of land forces.

Army space modernization planning is also consistent with the overall Army modernization strategy. The Army's concept and technology development efforts for space are directed at ensuring the necessary full spectrum capabilities will be available for the Objective Force to achieve the characteristics described in the Army Vision and to execute the enhanced operational concepts of *Joint Vision*

2020. In the near-term, Army space systems are being upgraded to keep pace with user demands for accurate, secure, and timely information for the Legacy and Interim Forces. Preplanned Product Improvements (PPI) to Army legacy systems take advantage of future architectures and spacecraft advances.

Army space modernization efforts to enhance warfighter support from space focus on establishing Information Superiority and enabling the enhanced operational concepts of JV 2020. The priorities are:

- Supporting Satellite Communications (SATCOM) growth and connectivity,
- Resolving Global Positioning System (GPS) vulnerability in the near term,
- Improving ISR timeliness and assured receipt to the warfighter, and
- Developing space control capabilities to assure access to key space capabilities and denying access to our adversaries.

### **Contributions to the JV 2020 Enhanced Operational Concepts**

Space is well suited to supporting global, force projection operations, as well as in-theater operations in a dynamic, multidimensional battlespace. Space products and services enhance the effectiveness of individual Army systems by providing the advantages of the high ground on a grand scale while being relatively

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less vulnerable and politically encumbered than terrestrial or aerial systems. Space is an enabling companion to battlefield digitization, enhancing the overall capability to exploit information, to direct forces, and to mass the effects of the joint force throughout an area of operation. The synergy created by space applies not only to operations during major regional conflicts, but also to full spectrum operations including peacekeeping/enforcement and humanitarian assistance.

### **Information Superiority**

The forward presence and global communications provided by space systems make them essential to gaining information superiority and the conduct of information operations. Space support is especially valuable during rapidly developing force projection operations in immature theaters.

Space systems, integral to information operations, contribute to the collection, processing, dissemination, and use of battlefield data and tactical information. Furthermore, Army space programs and initiatives contribute to situational awareness and understanding of an adversary's information-related capabilities and friendly force capabilities for degrading or denying enemy information. The force enhancement functions of space—WTEM, ISR, MW, and PNT—support situational awareness throughout the multiple dimensions of a battlespace. Through the use of ground segments such as Small Tactical Terminals (STT) and Integrated Meteorological System

(IMETS), space systems will provide environmental and terrain conditions in threat-occupied areas where directly observed surface information is unavailable. Land force commanders will have access to several atmospheric and ground parameters, to include soil moisture, which enables trafficability assessments. The Battlefield Ordnance Awareness (BOA) demonstration is researching technologies to provide space-based sensors to detect and characterize ordnance events on the battlefield. The Space-Based Infrared System (SBIRS), designed primarily as a ballistic missile launch detection sensor, will contribute further to situational awareness by detecting and categorizing other infrared-detectable battlespace characterization and technical intelligence events on the battlefield.

As more nations gain access to space capabilities, the need to control space will become a military necessity. There is already wide availability of global, satellite-based communications systems that have military utility, and the availability of high-resolution commercial imaging is a source of great concern. As order-to-delivery times decrease, commercial imaging systems will be capable of providing tactically significant products to potential adversaries. This capability could assist an adversary's implementation of an anti-access strategy and potentially limit U.S. military options. Space control will be an essential element in ensuring theater access, access to space and space capabilities, and land force information superiority. Future Army operations

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and equipment will require information operations methods that exploit an adversary's space capabilities and protect friendly forces from space-based observation. These will include capabilities for in-theater space surveillance; protecting vital Command, Control, Communications, and Intelligence Surveillance and Reconnaissance (C3ISR) assets; and deceiving, denying, degrading, disrupting, and/or destroying an adversary's space systems when directed.

### **Dominant Maneuver**

The various Military Satellite Communications (MILSATCOM) programs support communication requirements at all echelons during force projection. Included are secure, reliable, high-capacity (wide bandwidth and multichannel) service and en route mission planning and rehearsal capabilities. Increasingly, commercial space initiatives will also augment military space. Grenadier BRAT (GB), which integrates GPS and communications technology, enables extended range reporting of friendly locations and status. GB also provides a link between digitized and nondigitized forces such as members of a coalition. GPS receivers enable elements to know precisely where they are, even when the surrounding terrain is unfamiliar, uncharted, or featureless. The Tactical Exploitation Station (TES), a Tactical Exploration of National Systems (TENCAP) system, will provide a highly deployable, integrated, scaleable intelligence system specifically designed for split-based operations. Its versions will have robust global and

tactical communications connectivity. It will serve as a preprocessor of the All Source Analysis System (ASAS), the Joint Surveillance Target Attack Radar System (JSTARS) Common Ground Station (CGS), and the Digital Topographic Support System (DTSS).

Space products and services enable high-speed, dispersed maneuver and synchronized theater-wide application of firepower and massing of other battlefield effects. The timing required to coordinate decisive operations is enhanced by the precision PNT capabilities afforded by GPS, near-real-time ISR of space-based sensors, and the capability to access high-volume, digitized information in various forms via Military Satellite Communications (MILSATCOM), Global Broadcast Service (GBS) and national intelligence assets.

### **Precision Engagement**

Several space integration initiatives support this enhanced operational concept. Embedded GPS receivers on weapons platforms and guided munitions support extended-range engagements required to shape the battlespace in depth. The situational awareness enabled by Army TENCAP's exploitation of national technical means is a major element in seeing the battlespace early and continuously. The field artillery's Profiler system will benefit from integrated space-based weather data. The Eagle Vision II tactical ground station will provide warfighter access to the growing array of commercial imagery products. An adjunct to the GB system—Army Command and Control Space Enhancement Program

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(AC<sup>2</sup>SEP)—will demonstrate the use of a laser designator in conjunction with the GB terminal for extended-range target designation. Future space sensors will detect ground targets and link with distributed common ground stations, such as TES, providing target information directly to the tactical warfighter. Conceptual analyses are also ongoing for joint space operations that may include Force Application from space in the context of fire support to land forces.

### **Full Spectrum Protection**

JTAGS receives ballistic missile launch data collected by Defense Support Program (DSP) surveillance satellites. JTAGS enables early warning to deployed forces by providing the theater commander an in-theater processing capability that computes the estimated launch point and predicted impact point. This enables implementation of timely passive defense measures, as well as Joint Theater Missile Defense (JTMD) attack operations that may include Unmanned Aerial Vehicles (UAV), Special Operations Forces, Apache helicopters, and Army Tactical Missile Systems. Expanded battlespace and efficient fire distribution for Patriot and other active defense systems are also supported by JTAGS. In the mid-term, the SBIRS surveillance satellites will increase the accuracy and timeliness of launch point estimation and impact point prediction data provided by the improved JTAGS, the Multi-Mission Mobile Processor (M3P). Transmitting theater missile launch warning to handheld pagers has the potential to provide additional minutes

of warning time to soldiers in the impact area. Warfighter I, an Air Force-led experiment, will assess the tactical utility of hyperspectral imagery sensors to detect and characterize environmental threats and manmade threats, such as minefields and obstacles, to land forces.

### **Focused Logistics**

Military SATCOM, augmented by commercial space communications, will enable logistics management by staffs in CONUS or other home bases, providing the capability to exchange and update large databases between split-based elements. Supplies in transit or in-theater can be tracked by satellite-based communications linked to GPS. Such capabilities could reduce the need for large holding yards of equipment and containers. They also make logistics more agile, permitting en route visibility of assets and dynamic transport of supplies into theater. Added benefits will be reductions in the in-theater force and strategic lift requirements as well as reduced vulnerability. GBS will have the potential to support soldier services and will provide a means to maintain current situational awareness on theater-specific information. Such capabilities will be especially valuable during extended deployments involving the full spectrum of military operations from humanitarian assistance through major conflict.

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## **Functional Area Force Enhancements**

### **Satellite Communications (SATCOM)**

Army forces are dependent on electronic communications, both line-of-sight (LOS) and beyond-line-of-sight (BLOS), with operational concepts increasingly dependent on assured BLOS communications. The communications architecture, largely space-based, is the “backbone” that enables forces to leverage all other space capabilities. Robust, reliable, space-based communications provide key capabilities to land forces.

To enhance the benefits of space-based communications in the Legacy and Interim Forces, the Army is fielding smaller, more versatile, more mobile, secure, multiband/multipurpose SATCOM terminals. The Legacy and Interim Forces will have improved capability to extend terrestrial networks, achieve BLOS capability, enable reachback, and have a reduced required lift and improved data distribution to meet today's demands for voice, data, and imagery transmissions. MILSTAR satellites and terminals will provide Legacy, Interim, and Objective Forces with protected/anti-jam satellite communications currently not available to our tactical forces at corps level. SATCOM terminals for the Objective Force will focus on increased capacity, global broadcast capabilities for rapid dissemination of information, increased integration, and better mobility.

## **Position, Navigation, and Timing (PNT)**

All-weather, accurate PNT provided by GPS satellites is critical to battlespace awareness, enhanced lethality, and survivability. The user segment consists of receivers that accept the satellite signals and compute position and time for the user—a capability that enhances combat identification and blue force tracking (reducing and preventing fratricide), precision targeting, and synchronization on the battlefield. The GPS User Equipment (UE) family consists of different models meeting needs that range from the foot soldier to high performance weapons platforms.

On-going efforts to embed, integrate, and miniaturize GPS into our equipment and weapons platforms highlight the criticality of this capability across the spectrum of operations and our increasing reliance on GPS satellites. However, the vulnerability of GPS to jamming is a serious problem for the Army. The GPS signal that affects every maneuver unit, Command, Communications, Computers, and Intelligence (C4I) network, and weapon system may not get through when it is most critically needed. Modernization efforts are focusing on embedded capabilities and protection of use of the PNT GPS system. The Navigation Warfare (NAVWAR) program, directed by the Under Secretary of Defense, Acquisition and Technology (A&T), to address known GPS vulnerabilities, is now a component of the GPS modernization program. NAVWAR examined design alternatives to provide enhanced military



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performance and reduce vulnerability while maintaining uninterrupted civilian use. The Army anticipates upgrading or replacing all Army GPS receivers during the FY04-15 timeframe. Greater host vehicle dynamics and the need for interfaces to other navigation, communications or control systems will require enhanced capabilities for the Objective Force.

### **Weather, Terrain, and Environmental Monitoring (WTEM)**

There are a number of phenomena that occur on the surface of the sun and in space, which can have a dramatic effect on communications and GPS signal reception and on radar systems. Knowledge of these "space weather" events and assessment of when, how, and to what degree friendly systems will be affected allows commanders to plan around periods of signal interruptions.

Detailed, current knowledge of local terrestrial weather also enhances operational planning. Tactical commanders need terrestrial weather systems to provide weather without the current 4-8 hour latency. The emerging capability to integrate near-real-time "tactical weather" from weather satellites will greatly enhance the planning capability of Legacy to Objective land forces by providing detailed, current knowledge of local weather conditions. Modernization will provide current information and enhance dissemination so that it can be integrated more effectively into the battlespace planning process.

Army forces also require on-demand, accurate terrain data and maps of

specific theaters and areas of operation around the world. The digital terrain data is used in simulators to accomplish mission planning and rehearsals or to provide updated map products to land forces. Space assets provide the capability to meet that need. While currently limited to specific major theaters, evolving capabilities will provide global digital and 3D terrain products, enhancing battlefield visualization, operational planning, and targeting for Objective Force units.

Environmental monitoring capabilities of space assets also provide key information to land force commanders. Our ability to conduct Intelligence Preparation of the Battlespace (IPB) in the Objective Force can be enhanced by hyperspectral imagery (HSI) from space. HSI allows us to detect environmental changes that heretofore could only be detected by soldiers on the ground (usually too late to have been considered in any operational planning). Additional capabilities include soil saturation monitoring for trafficability analysis, manmade or natural obstacle detection and avoidance, and observation and prediction of the effects of Weapons of Mass Destruction (WMD). Current warfighter experiments, which leverage civil and commercial space assets, are examining the use of HSI to support the warfighter. As the technology develops, this capability will be integrated into the planning process to support the Objective Force.

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## **Missile Warning (MW)**

Early, accurate, focused MW is critical to full spectrum protection for targeted forces and critical assets and to minimize impact on nontargeted forces. Army JTAGS receive and process in-theater, direct, downlinked data from DSP satellites. This Army/Navy joint interest program (led by the Army) responds to accuracy and timeliness deficiencies in MW that were identified during Operation Desert Storm. Currently, DSP satellites detect the launch of a ballistic missile, track the missile, and provide data directly to JTAGS, located in theater. JTAGS makes and disseminates impact point predictions to implement warning and alerts/cues active missile defenses, and the system provides launch point determinations that can be used to trigger attack operations. JTAGS modernization will take advantage of more capable sensing satellites currently being developed.

## **Intelligence, Surveillance, and Reconnaissance (ISR)**

Space assets allow us to “see and hear” the enemy from the ultimate high ground—without putting soldiers at risk. On-demand, tailored ISR data is key to the tactical-level commander's decisive action, information dominance, and high OPTEMPO with short decision cycles. Getting this information disseminated directly to the warfighter is a key focus of Army space modernization. The near-term strategy to modernize ISR assets is to reduce the number of systems involved in receiving and disseminating ISR data for the land

component commander. On-demand, tailored ISR data to tactical-level commanders is the key to achieving the Army space operations concept. In addition to direct downlink capabilities to support the Objective Force commander's concept of operation, full spectrum dominance and Objective Force characteristics require direct, dynamic tasking and retasking capabilities for ISR assets. Mobile, dynamic networks and the seamless integration of terrestrial, airborne, and space communications will allow information to be distributed among sensors, warriors, weapons platforms, and support bases, allowing land force commanders to exploit speed and knowledge to increase Objective Force OPTEMPO.

## **Space Control**

The ability of the Army to execute the enhanced operational concepts of *JV 2020* and to maintain information superiority depends more and more on space assets. We must, therefore, minimize our vulnerabilities and assure the land component commander's access to space capabilities. A key element of this assurance is the ability to accomplish space control. Space control includes the elements of prevention of an adversary's use of our or a third party's space systems; the protection of our space assets; the surveillance necessary to maintain information awareness of the space battlespace; and, if necessary, the ability to negate an adversary's space capabilities. Part of the Army's space modernization program is to develop the suite of technologies and Doctrine, Training, Leader Development,

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Organization, Materiel, and Soldiers (DTLOMS) solutions to assure access to required space capabilities for the Objective Force.

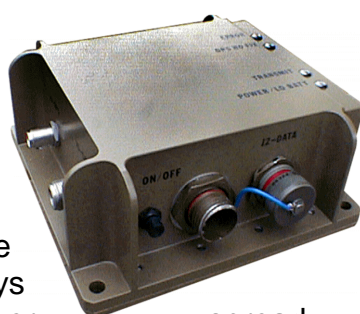
## **Space Modernization Programs**

Current Army space systems must be modernized to keep pace with warfighter demands for increased user information volume, accuracy, security, timeliness, and reliability. Since the Army's investment in space is primarily in ground terminals, Army space systems and PPIs to those systems must account for future architecture and spacecraft advancements. The Army participates in the development of future space system architectures and spacecraft in order to minimize the required modifications to ground programs and to ensure that the ground terminal programs keep pace with the spacecraft and system architecture advancements. Information on selected space systems is provided below. Additional information and systems are covered in other appropriate annexes.

### **Grenadier BRAT (GB) (Beyond Line-of-Sight Reporting and Tracking)**

#### **Description.**

The GB terminal is a small transmitter box with two antennas. The system employs low-output power, spread spectrum, and short-burst UHF



transmissions. GB's low probability of detection (LPD)/low probability of intercept (LPI) waveform is compatible with Aviation and Special Operations. GB uses the same LPI/LPD used by the Combat Survivor Evader Locator (CSEL) radio being fielded to all Services. It integrates with the Enhanced Position Location Reporting System (EPLRS) and joint protocols and communications, leveraging existing infrastructure to include communications relay systems, worldwide broadcast systems, and existing command and control systems.

**Operational Requirement.** GB, a Warfighter Rapid Acquisition Program (WRAP), receives location and time data from the GPS system and transmits this information, along with a unique vehicle, equipment, or personnel identifier to receiving command centers. Using embedded brevity codes, operators can also transmit status reports. It is a cost-effective enhancement to situational awareness that extends force tracking beyond line-of-sight, designates extended-range targets, monitors force status in immature theaters, and extends digitized situational awareness to nondigitized forces or coalition members.

**Program Status.** A limited buy of 450 GB for Special Operations Forces (SOF) and selected units is currently being fielded. In the mid-term, a GB follow-on with two-way communications is planned. In the far-term, an evolution of GB is planned to include high data rate communications of voice, data and imagery for the Objective Force.

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## **Big Crow**

**Description.** Big Crow is a series of Electronic Warfare (EW)-capable ground and airborne suites that were previously used exclusively for developmental and operational test and evaluation of radar, missile, and sensor systems.

**Operational Requirement.** While serving as a test and evaluation asset, Big Crow demonstrated potential for service as a space control platform. As a result of its space control application potential, Big Crow has been transferred to SMDC where it will also serve as an Army space control asset.



**Program Status.** The Army is currently seeking funding to maintain the system operations and to support Legacy and Interim Forces.

## **Joint Tactical Ground Station (JTAGS)/Multimission Mobile Processor (M3P)**

**Description.** JTAGS can be deployed worldwide. The normal deployment complement, a JTAGS detachment, consists of two JTAGS units that provide the necessary survivability and redundancy to satisfy the requirement for continuous MW operations in support of a theater. Each unit includes a JTAGS shelter,

external collapsible high-gain antennas, a standard military generator, and standard five-ton trucks as prime movers. JTAGS can be deployed via ship or C-141 or larger aircraft and is transportable over primary roads.

**Operational Requirement.** JTAGS alerting and cueing using DSP data enhances the capabilities of the Patriot Air and Missile Defense systems today. Its modernized M3P will do the same for the Theater High Altitude Area Defense (THAAD) and Medium Extended Air Defense (MEADS) systems for the Legacy through Objective Forces using more accurate SBIRS data. Accurate launch point location from JTAGS/M3P enhances the lethality of attack operations for all joint deep-fire systems. Supplemental warning and alarm systems, using JTAGS/M3P information and space-based communication means, will improve survivability of all our deployed forces.



**Program Status.** Ongoing modernization to the M3P will enable JTAGS to receive, process, and disseminate data from the follow-on SBIRS satellites that will provide more



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accurate information on a greater variety of threats, providing increased protection for deployed forces.

### **Communications Satellite Terminals**

**Description.** The modernization of the full range of SATCOM terminals is detailed in the Command, Control, and Signal Systems annex of this plan (Annex E, Information Superiority). The result of the modernization will be more mobile and versatile terminals fielded in greater numbers to support the warfighter.

**Operational Requirement.** SATCOM modernization is necessary just to meet today's high demand to extend terrestrial communications and provide increased capacity. Legacy and Interim Forces require the more mobile, multipurpose Single Channel Anti-jam Man-Portable (SCAMP), the multi channel SHF Tri-Band Advanced Range-Extension Terminal (STAR-T), and the Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T) Extremely High Frequency (EHF) systems. These systems will be augmented for high-volume, one-way information flow by the GBS system, which will be available for the Legacy, Interim, and Objective Forces. The key to meeting Objective Force



requirements will be the fielding of the Multi-Band Integrated Satellite Terminal (MIST). MIST's expanded frequency capability will provide the flexibility and deployability required by future Army forces and will reduce the number of SATCOM systems while providing increased capability such as SATCOM on-the-move.

**Program Status.** SCAMP, STAR-T and SMART-T terminals are now being fielded. GBS terminals should be available by the end of FY01.

### **Global Positioning System (GPS)**

**Description.** GPS is a space-based navigation system that distributes positioning, velocity, and time (PVT) data. It has three segments: a space segment (24 satellites), a ground control segment, and a user equipment segment. User equipment consists of receivers configured for handheld use with ground, aircraft, and watercraft applications. Military GPS receivers have Precise Positioning Service (PPS) capabilities that provide enhanced accuracy and signal protection; commercial units do not. The Army represents over 80% of the Department of Defense (DoD) requirement for user equipment. Systems include the Precision Lightweight GPS Receiver (PLGR), the Small Lightweight GPS Receiver (SLGR), the Standalone Air GPS





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Receiver (SAGR), the Cargo Utility GPS Receiver (CUGR), the Defense Advanced GPS Receiver (DAGR), the GPS Receiver Applications Module (GRAM), and the GPS Inertial Navigation System (GPS/INS).

**Operational Requirement.** GRAM and GPS/INS will allow the integration of new GPS technology to a broad range of host platforms and vehicles. The GPS Tactical Operational Requirements Document projects the total number of receivers required during this timeframe to exceed 650,000 at an estimated initial procurement cost of \$1.5 billion. In addition to Army efforts to modernize user segments to reduce vulnerabilities, enhanced capabilities for Objective Forces will also require a modernized space segment for GPS.

**Program Status.** The Army has acquired more than 83,000 PLGRs, the primary handheld GPS receiver. Most SLGRs, a commercial GPS receiver bought during Desert Storm, have been removed from service except for interim use in some aircraft. The Defense Advanced GPS Receiver (DAGR) has been designated a Horizontal Technology Integration (HTI) initiative and will incorporate design changes dictated by GPS modernization. The DAGR will replace most PLGRs.

### **Integrated Meteorological System (IMETS)**

**Description.** IMETS is a High-Mobility Multipurpose Wheeled Vehicle (HMMWV)-mounted tactical system that provides automation and communications support to staff

weather teams assigned to echelons from brigade through echelons above corps (EAC) and to Army SOF. IMETS receives polar-orbiting civilian and defense meteorological satellite information from the Air Force Global Weather Center and integrates this weather information with data from artillery meteorological teams, remote sensors, and civilian forecast centers.



**Operational Requirement.** The IMETS is an integral part of the Army's digitization effort. The system provides first-in weather support to contingency forces, tailored weather information for deep fires and precision munitions, and weather effects decision aids for the planning and execution of maneuver and support. It processes and collates forecasts, observations, and climatological data to produce timely and accurate weather products tailored to the specific warfighter's needs. The automated tactical decision aids produced by the IMETS display the impact of the weather on current, projected, or even hypothesized conditions on both friendly and enemy capabilities. Instead of reacting to the weather, the warfighter can take advantage of the weather.

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**Program Status.** HMMWV-mounted IMETS are currently being fielded for echelon above corps units and aviation battalions. Light and command post configurations are also under development.

### **Digital Topographic Support**



#### **System (DTSS)**

**Description.** DTSS is a standard, automated, tactical combat support system capable of receiving, formatting, creating, manipulating, merging, updating, storing, and retrieving digital topographic data and multispectral imagery data from the National Imagery and Mapping Agency's (NIMA) standard digital databases, commercial or civil sources, and national technical means assets. It then processes these data into hardcopy and softcopy topographic products for warfighters. The system uses the latest commercial off-the-shelf technology in printers, scanners, and computer workstations combined with image processing and geographic information system software. DTSS is supported by environmental control units, generators, and communications equipment that are part of the standard Army inventory.

**Operational Requirement.** The DTSS will provide updated map background, terrain intelligence, and terrain data management to all the Army Battle Command System (ABCS) workstations on the battlefield and accept terrain intelligence/data updates from these systems. It will provide commanders at brigade through echelons above corps with automated terrain analysis, terrain database management, and graphics reproduction in support of intelligence preparation of the battlefield, command and control, terrain visualization, and weapons and sensor systems.

**Program Status.** The tactical system is being produced in two variants: heavy (DTSS-H) and light (DTSS-L). DTSS-H is housed in a 20-foot International Standards Organization (ISO) shelter and mounted on a standard 5-ton truck. DTSS-L will be housed in a lightweight multipurpose shelter mounted on a HMMWV. A Preplanned Product Improvement (PPI) program for DTSS will ensure topographic support that meets warfighter needs through the Objective Force.

### **The Tactical Exploitation System (TES)**

**Description.** The Army relies on the TENCAP system to access national ISR data through SATCOM links. TES combines TENCAP functionality in a single integrated, scaleable system designed for split-based operations. TES will replace the Advanced Electronic Processing and Dissemination System (AEPDS), Enhanced Tactical Radar Correlator



(ETRAC), and the Modernized Imagery Exploitation System (MIES). TES is designed for split-based deployment and will consist of forward and main elements. TES Forward is a highly mobile, HMMWV-based element configuration; TES Main is housed in vans. Each element has similar operational, communications, and support capabilities.

**Operational Requirement.** TES is designed to provide the commander with maximum flexibility to satisfy intelligence needs in a wide range of operational scenarios. TES replaces multiple systems and will reduce errors, costs, and deployment time into the theater. In the far-term, the TENCAP TES will evolve into an even more capable, more compact ground interface with sources of information to be integrated for the Objective Force. A Distributed TES (DTES), consisting of modular components of TES, is programmed for support to a division, but may also be available for Interim Brigade Combat Teams (IBCT). A TES Light, consisting of modular components of TES, is being considered for selected Army and SOF elements not requiring a vehicle-configured system.

**Program Status.** The TES program reflects the near-term modernization strategy. Forward TES has been fielded to XVIII Corps and full TES is

currently being fielded there to maintain their combat overmatch capability and enhance their deployability. Five full TES systems and additional DTES assets are funded in the FY02-07 Plan and will be fielded in the near term.

## Assessment

The modernization efforts outlined in this annex show that the Army is on the right path for transforming space capabilities and organizations to achieve the characteristics of the Objective Force. Much is left to accomplish.

The Doctrine, Training, Leader Development, Organization, Materiel, and Soldier (DTLOMS) solutions to space shortfalls are progressing well throughout the Army, particularly with the establishment of Functional Area 40, Space Operations Officer. Materiel solutions are more problematic. Many materiel solutions depend not only on allocation of scarce Army resources for the ground segment of space systems, but also on the allocation of resources external to the Army for the space segment modernization. To optimize future investments, the Army must derive and quantify warfighter space requirements and synchronize solutions with the other Services, DoD, other government agencies, and the commercial sector. This process requires support for new initiatives, reprogramming of some existing or planned programs, and perhaps cancellation of others.

The Army will continue to exploit and leverage space capabilities of other

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Services and organizations and must be prepared to participate substantively in investments made by them. When commercial systems show promise to satisfy requirements and have applicability to Army modernization efforts and future warfighting, the Army will need to invest near-term resources to achieve

a potential significant future return on that investment.

Finally, the Army must protect its investment in space and develop the space control and related measures that will assure access to those capabilities that are required to accomplish Transformation and enable the Objective Force.

## ANNEX G: FORCE STRUCTURE

### Overview

Army Force Structure provides the Nation with full spectrum land force capability. Army Transformation is designed to enhance capabilities where resident and gain capability where lacking to meet the tenants of *Joint Vision 2020 (JV 2020)*. This dynamic process drives force structure changes and supports the design of forces to meet the Army's full spectrum of missions.

The Army is comprised of Active Component (AC) and Reserve Component (RC) soldiers and civilians. In FY01, it is organized into four corps, 18 divisions (ten AC and eight Army National Guard (ARNG)), 15 ARNG enhanced Separate Brigades (eSBs),

three ARNG strategic brigades and numerous other combat, combat support (CS) and combat service support (CSS) units (Figure 1). The Army requires balanced readiness and adequate funding through FY07 for an AC with an end strength of approximately 480,000 soldiers; a RC with an end strength of approximately 555,000 soldiers (350,000 ARNG and 205,000 U.S. Army Reserve (USAR)); and a civilian workforce of approximately 210,000 personnel.

### Army Force Structure Initiatives

The Army's Transformation process provides for a strategically responsive force that is dominant across the full

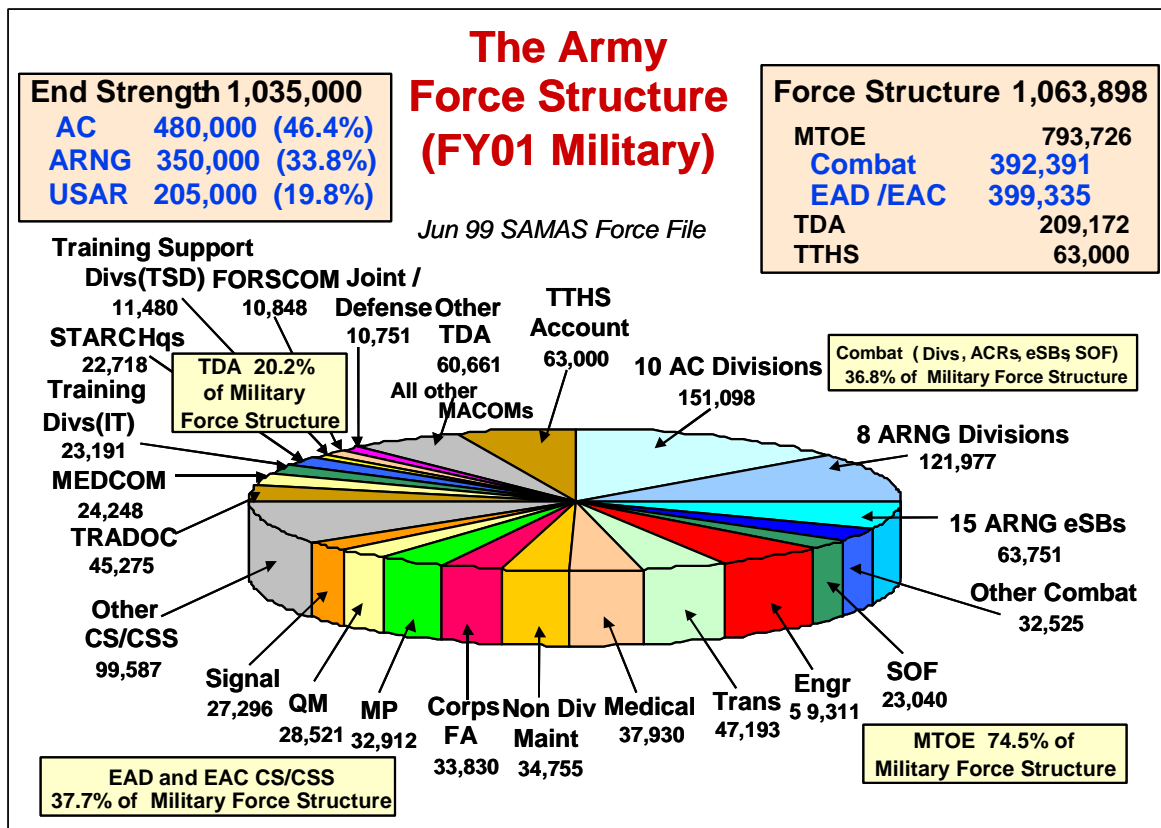


Figure 1. FY01 Army Military Force Structure



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spectrum of operations in a joint, interagency, and multinational environment. The Army will continue to modernize and recapitalize selected Legacy Force elements to retain significant overmatch capability throughout the Transformation process. Simultaneously, the Army will transform an Interim Force of six to eight brigade combat teams that will meet the near-term requirements in support of warfighting Commanders-in-Chief (CINCs) by bridging the gap between our light and heavy forces that can operate across the full spectrum of conflict. During this period, the Army will significantly invest in science and technology (S&T) to acquire the Future Combat Systems (FCS), the centerpiece of the future Objective Force capability.

Throughout Transformation, the Army's Legacy Force will maintain a core force that is recapitalized and fielded with new equipment that will increase lethality, situational understanding, and battlefield dominance.

The Interim Force is designed to meet the near-term requirements in support of warfighting CINCs. It is essentially the Army's bridge capability to the Objective Force. The Interim Brigade Combat Team (IBCT) is a fully mobile, air deployable force that normally fights as part of a division in a joint and/or coalition operation, is able to respond rapidly to crises, and operates effectively in peacekeeping or enforcement operations.

The Interim Force will consist of six to eight IBCTs to include a minimum of one ARNG brigade, providing the joint force commander increased

operational and tactical versatility to execute fast-paced, distributed, noncontiguous operations.

The Army began the Transformation process in early 2000 at Fort Lewis, Washington, with the 3rd Brigade, 2nd Infantry Division, converting to the IBCT design. The 3rd Brigade, 2nd Infantry Division will achieve Initial Operating Capability (IOC) by June 2003. The second unit to transform, also at Fort Lewis, is the 1st Brigade, 25th Infantry Division. It is scheduled to complete conversion by September 2001 with its third infantry battalion undergoing conversion by March 2002. The 1st Brigade, 25th Infantry Division will reach IOC by June 2004. The IBCTs will receive a family of Interim Armored Vehicles (IAVs) that will provide an enhanced capability to the brigade combat teams.

The Army is developing the organizational and operational concepts for interim organizations at division through corps levels and will refine these concepts as they apply to the Objective Force. The Army's fielding of developing technologies will be fully considered in this process as well as in the following force structure efforts.

The Army Medical Reengineering Initiative is focused on the following operational tenet: provide split-based operational capability; improved tactical mobility; reduced-footprint; fixed communications; advanced information technology; and flexible, deployable, and tailorable units.

The Army National Guard Division Redesign Plan will convert up to 12

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maneuver brigades and slice elements from two divisions to combat support and combat service support units by FY11 in order to meet wartime and domestic support requirements.

The Army is programmed to have 132 multicomponent units by FY07. By the end of FY01, the Army will have 36 multi-component units.

The Army established two AC/ARNG Integrated Divisions in October 1999, each consisting of an AC headquarters, commanded by an AC Major General, and three ARNG eSBs.

Introduced in the Chief of Staff, U.S. Army's (CSA's) "One Team, One Fight, One Future" white paper, Army teaming pairs selected AC, ARNG, and USAR units for mutual support of operational requirements.

The Army is conducting a comprehensive reengineering study to review Army Headquarters from corps through major command (MACOM) levels to provide for strategic responsiveness and battle command for the Objective Force.

The Army is conducting a phased transformation for Headquarters, Department of the Army, to gain efficiencies and effectiveness across all functional areas. Functional areas will be streamlined based on capitalizing on information technology.

The Army's Training and Doctrine Command (TRADOC) is conducting a reengineering study to review organizational efficiencies in the training base that will provide enhanced training and leader

development to support Transformation.

All Army force structure initiatives will be synchronized with the 2001 Quadrennial Defense Review (QDR). The QDR may have additional impacts on the Army's force structure and must be closely synchronized with the Transformation Strategy to ensure the Army retains its capability to execute the National Military Strategy (NMS) and to meet Title 10 responsibilities (Figure 2).



**Figure 2. Title 10 Responsibilities**

Throughout the Transformation process, these principles and goals will guide the Army's force structure initiatives in the program years:

- Increase strategic responsiveness.
- Develop the capability to put a combat force anywhere in the world in 96 hours after liftoff, in brigade combat teams for both stability and support operations and for warfighting. Build that capability into a momentum that generates a warfighting division on the ground in 120 hours and five divisions in 30 days.

- Improve operational jointness.
- Develop leaders for joint and coalition warfighting.
- Continue AC/RC integration.
- Man warfighting units first.
- Provide for the well being of soldiers, civilians, and their families.

The Army's ability to support the NMS remains central to determining its force structure requirements as we plan and execute initiatives to transform the Army. The Army intends to leverage information technology and structure a totally integrated force that is sized and shaped to meet NMS commitments to achieve full spectrum dominance (Figure 3).

## Total Army Analysis and QDR 2001

In May 1997, the Department of Defense (DoD) conducted the first QDR. The second QDR (2001) process is ongoing. The Army's strategy is to use Total Army Analysis 2007 (TAA-07) and TAA-07.1 as the QDR baseline. TAA is an objective, doctrine-based process that establishes the total Army force structure to support the National Military Strategy as articulated in the Defense Planning Guidance. These requirements are matched against the current force and distributed across Army components. Unlike previous TAAs, TAA-07 was the first to employ a capabilities-based, threat-adaptive requirement (Mission Task Organized Forces (MTOF)), to clarify the Army's

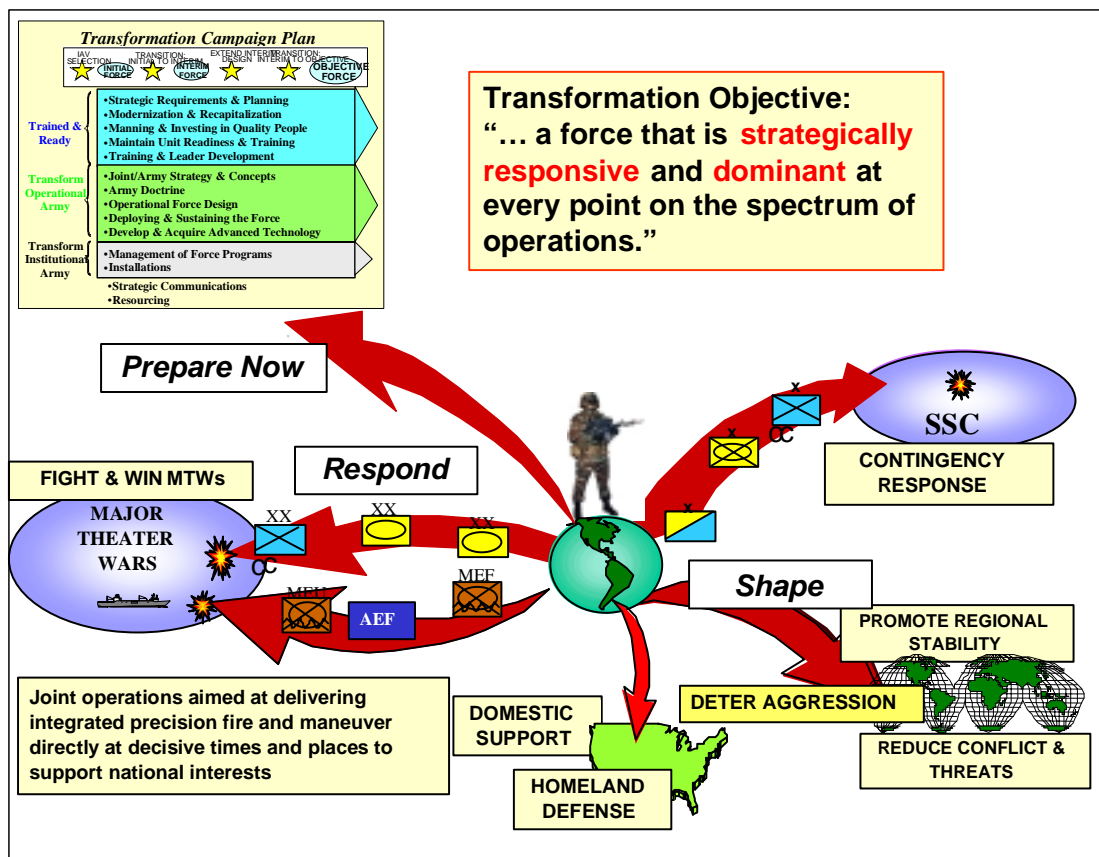


Figure 3. Transformation Objective

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force structure for both the operating force and generating force requirements. TAA-07.1 addressed the Army's Transformation initiatives and resourced three IBCTs. QDR 2001 will assess force structure requirements throughout the DoD. For the Army, this includes CINC day-to-day shaping and engagement requirements as well as Small Scale Contingencies (SSCs), including peacekeeping operations and humanitarian assistance. Additionally the requirements of Homeland Defense, Strategic Reserve, Domestic Support, Base Engagement Force, and Base Generating Force also affect Army force structure. None of these release the Army from the requirement to maintain the structure necessary to execute two near-simultaneous Major Theater Wars (MTWs).

## Operating Force Structure

The Army's operating force must be sufficient in both size and capabilities to meet all requirements implied in the NMS to provide the Nation with a full range of options that shape the international environment, as well as respond to CINC engagement activities. The operating force must be able to operate across the full spectrum of conflict and remain relevant to winning our Nation's wars—by being responsive, deployable, agile, versatile, lethal, survivable, and sustainable.

The operating force is the warfighting portion of the Army, the force that fights and wins the Nation's wars by providing the combat capability necessary to sustain land dominance. In addition to responding to a potential two-MTW scenario, the operating force

conducts operations in support of CINC day-to-day requirements, Stability and Support Operations (SASO), and other non-MTW requirements.

The operating force accounts for approximately 795,000 "spaces" across all three Army components. A breakout follows:

AC	– 303K
ARNG	– 352K
USAR	– 140K

Approximately 52,000 operating force requirements are unresourced and resident in Compo 4 (required but not resourced).

The Army has prioritized its force structure to accomplish the two-MTW scenario. Daily operations critical to the success of the overall Army mission simply did not have visibility in a once robust force structure environment. As the force structure picture has changed, visibility of routine tasks and their requirements for force structure have undergone critical examination. The Army has a number of studies underway that are expected to identify additional non-MTW related requirements and have potential impact on the end state of the operating force.

**Rotating Rule Study.** This study will determine the effect of rotation rules on force structure requirements. The base case analysis is complete and the Center for Army Analysis (CAA) is working on excursions, including all currently identified operational requirements.

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**CINC Shaping and Engagement Requirements.** The Army will attempt to clearly identify all CINC day-to-day requirements. Additionally, it will identify the difference between TAA developed requirements and CINC requirements. The results will be applied to prioritization of requirements in the TAA process.

**Army Support to Other Services (ASOS) and Executive Agent (EAR).** The Army will identify force structure requirements associated with ASOS/EAR through direct input from Army Service Component Commands (ASCCs) and CINCs.

**High-Demand/Low-Density Units (HD/LD).** The Global Military Force Policy identifies specific Army force structure organizations as HD/LD (biological detection companies, patriot battalions, civil affairs battalions and technical escort units). The current operating environment has placed significant stress on organizations categorized as HD/LD. The Army must ensure adequate resources are available to sustain ongoing operations for extended durations.

The Army is fully engaged in the daily shaping activities supporting the NMS, providing the majority of forces for joint operations. The CINCs routinely employ the Army as their force of choice and as a most effective tool in executing theater engagements. Maintaining our overseas presence and engagement activities promotes regional stability and gives substance to our security commitments. Additionally, the Army serves as a role model for militaries of emerging democracies and promotes internal

stability and democratic growth for such nations. These requirements must be fully articulated for each Theater Engagement Plan (TEP) and included in the Army's force-sizing equation to ensure adequate forces are available to fulfill these critical requirements.

## **Generating Forces**

Under Title X, the Army's Generating Force (primarily TDA units) has responsibility for providing the management, development, readiness, deployment and sustainment of the Operating Force (Figure 4). The size and capabilities of this Generating Force are based upon and, in some ways, dependent upon the size and capabilities of the supported Operating Force.

The effort to link the Generating Force structure to the Operating Force Structure was incorporated into the TAA-07 process. This effort captured the Title X functions and capabilities, as defined in Department of the Army (DA) PAM 100-1 pamphlet, across the Army's institutional base, industrial base and infrastructure, as represented by Headquarters, DA (HQDA), the MACOMs, field operating agencies, and staff support agencies. The Army's Generating Force consists of approximately 2,400 units and is comprised of the effective combination of military, DA civilian and contract personnel. These units are "linked" to the Operating Force through command and control (C2), logistical/administrative support, occupational skills, and geographic relationships.



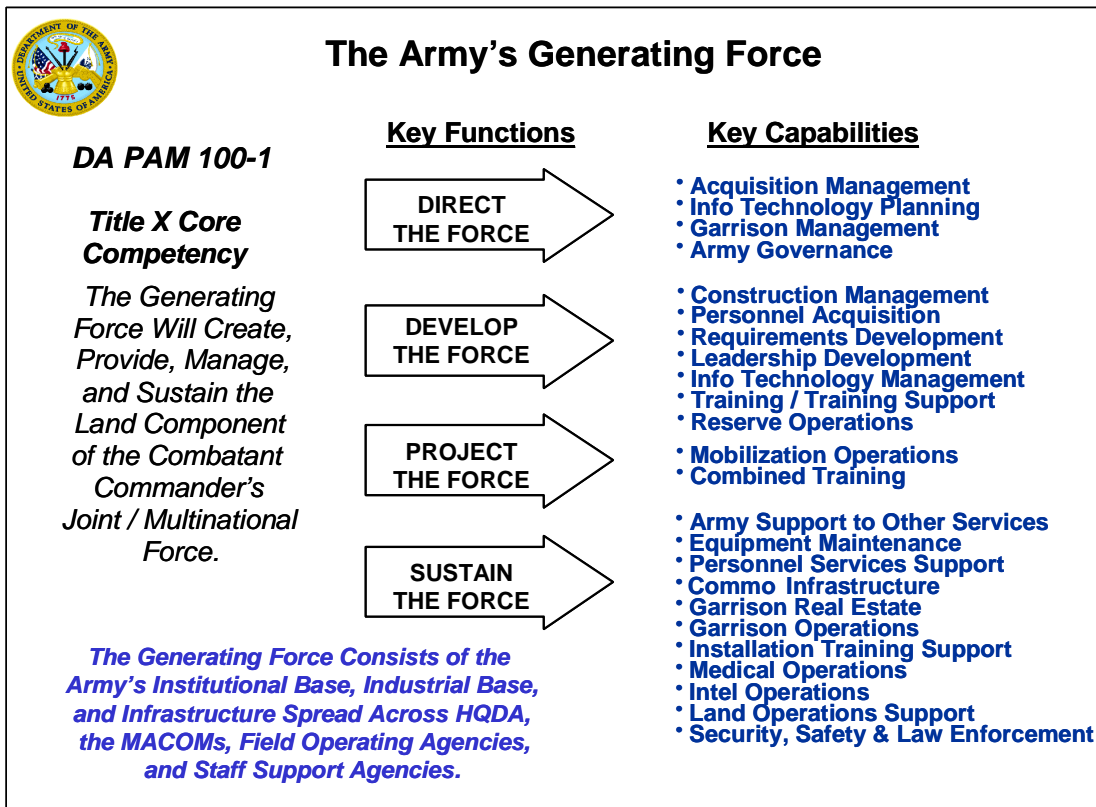


Figure 4. Army Generating Force

The Generating Force, like the Operating Force, is resourced within programmed end strength. The current strength of the Generating Force is 209,000 military, 221,000 civilians, and 215,000 contractors. Since both forces must compete for the same resource pool, management of workforce mix (military, civilian, and contractor personnel) within the Generating Force is critical. Historically, the Generating Force has used approximately 20% of the military end strength across all three components (24% of AC; 10% of ARNG, and 30% of USAR). Beginning with TAA-07, the Army incorporated the Defense Reform Initiatives Directive (DRID) 20 and Federal Activities Initiative Reform (FAIR) Act to improve utilization of the workforce to ensure effective Title X support within manpower constraints.

## Division XXI and Limited Conversion Division XXI

The Army strives to stay abreast of emerging technologies and implement them to gain efficiencies in both its operating and generating force structures. In the heavy divisions of our operating forces, significant change has occurred. This change is known as Division XXI.

Division XXI and its interim step, Limited Conversion Division, are FY99 force structure actions that began to lighten the Army's heavy forces. The objective is to optimize Force Structure by building on information dominance. It applies the concept of technology "enablers" that add capability to a combat system.

By FY01, these initiatives have already reduced requirements for many of the heavy system platforms in five of the six AC heavy division units, two of the ARNG heavy divisions, and eight ARNG heavy separate brigades. These initiatives not only lighten the Army's heavy forces (reducing the strategic lift requirements for affected divisions by 11%), but also provide systems for "cascading" across the force to improve its modernization posture. The actions embedded in the Army Vision will further guide how we transform the whole Army to a more responsive, flexible, and capable force.

## Transformation Brigades

Recognizing the necessity to rapidly provide a full spectrum capable land force to operate in joint, combined, and multinational formations, the Army will transform its force structure to meet that requirement. The initial Transformation effort focuses on providing brigade-sized forces that will be more strategically deployable anywhere in the world to meet a variety

of missions, ranging from humanitarian assistance, disaster relief, peacekeeping, and SSCs to MTWs (Figure 5). In addition to its strategic deployability, this force will be operationally deployable with every vehicle in the force capable of movement within a theater via C-130 aircraft.

This force will greatly enhance the Army's ability to be dominant at every point of the spectrum, combining technological overmatch with superior-quality leadership, people, and training to provide warfighting CINCs a land force capable of deterring, containing, stabilizing or decisively terminating a crisis.

Using a mix of available systems and IAVs, as they are acquired, two IBCTs are being formed at Fort Lewis, Washington, to serve as the initial transformation. These units will develop the tactics, techniques, and procedures required for optimization in SSCs and will also influence Objective Force development.

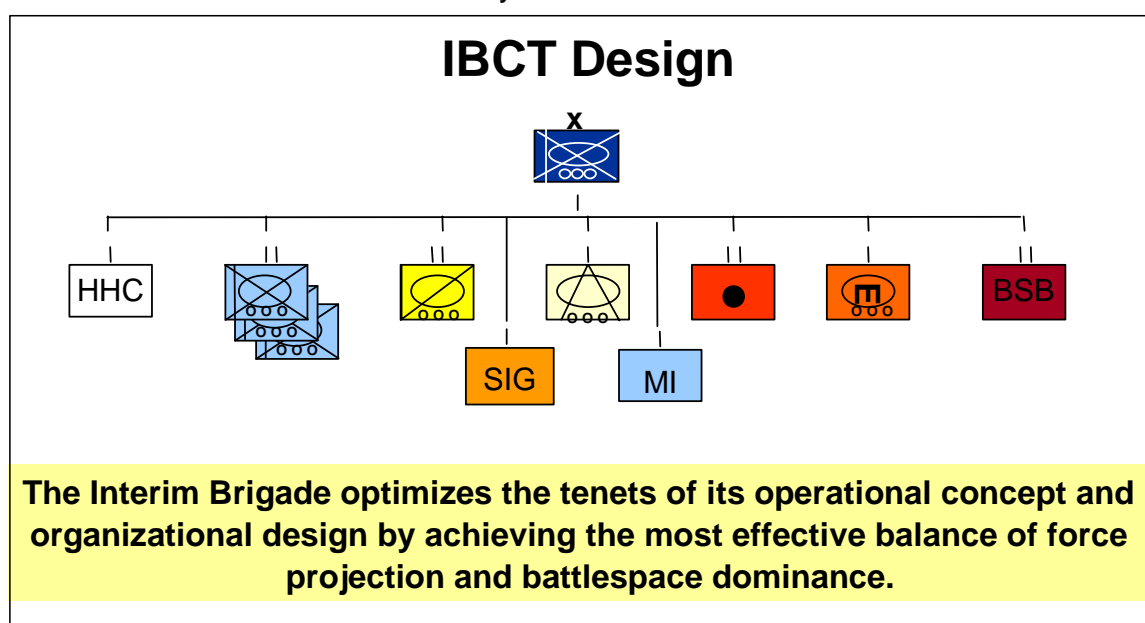


Figure 5. The IBCT

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Force structure transformation will aggressively reduce the deployed logistics footprint and replenishment demand in theater, contributing to the improved deployability goal.

### **Medical Reengineering Initiative**

The Medical Reengineering Initiative (MRI) is the Army Medical Command's EAD/EAC force redesign initiative that supports the Army's need for increased strategic responsiveness. This major Army initiative began with the inactivation of medical units in FY98. MRI conversion/activation began with nine units in FY00. One hundred sixty five of 391 MRI units (42%), including 70 units in support of the Counterattack Corps, will be converted/activated by FY06. These units are resourced through FY06, primarily through redistributing excess Class VII and Class VIII units, reprioritizing, cascading displaced equipment, and procuring new medical and nonmedical equipment. Two hundred twenty six MRI units (58%) are to be worked beyond FY06. MRI provides organizations that are easily tailored into capabilities-based packages that are capable of supporting the warfight from the corps, intermediate support base, or CONUS. MRI improves RC stationing and retention with smaller, modular organizations. MRI provides the infrastructure to support the Army digitization effort, insertion of telemedicine technologies, and other advanced medical and nonmedical information systems. MRI supports the Legacy Force while in transition to the Objective Force.

### **Institutional/TDA Redesign Axis (Generating Forces)**

The Institutional or Table of Distribution and Allowances (TDA) organizations are the key component of the generating force for the Army's operating forces. The Army's specified Title X core competencies and processes form the basis of the generating force. Therefore, redesign of the Institutional/TDA force is an integral part of the overall Army Transformation strategy.

#### **Institutional Army Reengineering.**

The following actions, as a minimum, are key to successfully achieving the Army's Transformation objective:

- Divest nonessential functions, remove unnecessary layering and duplication, consolidate functions, resource in the most cost-effective manner, and privatize/outsource functions where applicable.
- Transform Army Headquarters (corps through MACOM).
- Reallocate resources supporting core competencies; fully integrate those resources across the Army, other Services, and DoD.
- Reduce acquisition cycles by at least half, anticipating the needs of future organizations; complete major acquisitions within three budget cycles.
- Create and sustain a customer-focused learning organization that evaluates itself, eliminates obsolete structures, and designs better processes.

- 
- Rapidly create and project an appropriate and capable force to any area of the world.
  - Accomplish the reengineered generating force within the Army Vision.

At every level and in all organizations, soldiers and civilians must aggressively implement current initiatives, as well as generate new reforms, to produce efficiencies and, ultimately, savings for the Army. Through reinvestment and recapitalization, these savings will contribute greatly to the goals of providing modernized equipment to the force, reorganizing and preparing trained and ready units, and providing essential quality of life programs. Additionally, the nature of our future power projection Army will demand focused/precise logistics and improved command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR). As called for in *JV 2020*, we will apply quality management principles and the best business practices available to develop and implement focused logistics.

## **Impacts on Force Structure**

### **Reserve Component (RC)**

The RC provides approximately 54% of the total Army strength. The Army force structure goal is to have all AC and RC elements interchangeable. Nevertheless, there are several force structure programs that highlight the Army's RC.

### **Army National Guard Division Redesign Study (ADRS)**

As part of the Army's warfighting capability, the ARNG will continue to program 15 eSBs and two Special Forces Groups, as well as its divisional elements. In addition, the ARNG continues its execution of the ARNG Division Redesign Study (ADRS). This concept will convert up to 12 ARNG maneuver brigades and slice elements from two divisions to CS/CSS forces required to support the Army's warfighting requirements (Figure 6).

The ADRS converts approximately 48,000 of ARNG combat force structure to CS/CSS by FY09. The ARNG will convert six brigades to resource approximately 20,000 of CS/CSS between FY00-07. The majority of the structure to be resourced consists of transportation and quartermaster units. The ARNG will convert an additional 28,000 spaces (six brigades and slice elements from two divisions) by FY09. The division and brigade headquarters will be used to form a composite C2 headquarters for the CS/CSS structure. All conversions will be validated through the TAA process.

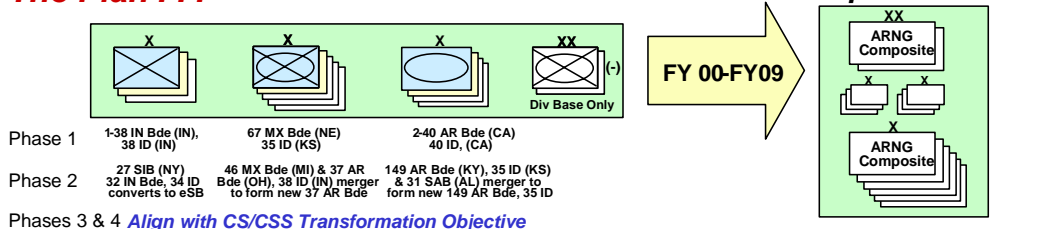
Approximately \$2 billion is budgeted for FY00-FY07 to resource the ADRS plan. Additional resources will be applied in future funding plans to procure necessary resources by FY09 and complete the ADRS conversions by FY11.

# Army National Guard Division Redesign

## The Problem . . .

- CS/CSS shortage
  - ... a long-standing Army problem.
  - ... highlighted by the CORM & the 1997 QDR.
- TAGs introduced an idea to solve the problem.
- CSA/SecArmy approved the plan March 1996.

## The Plan . . .



## The Timeline . . .

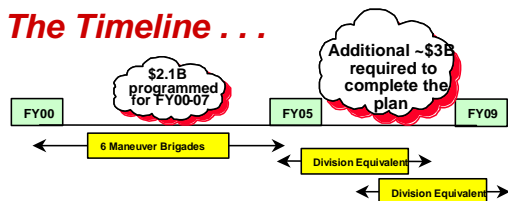


Figure 6. ADRS Implementation

## Multicomponent Units

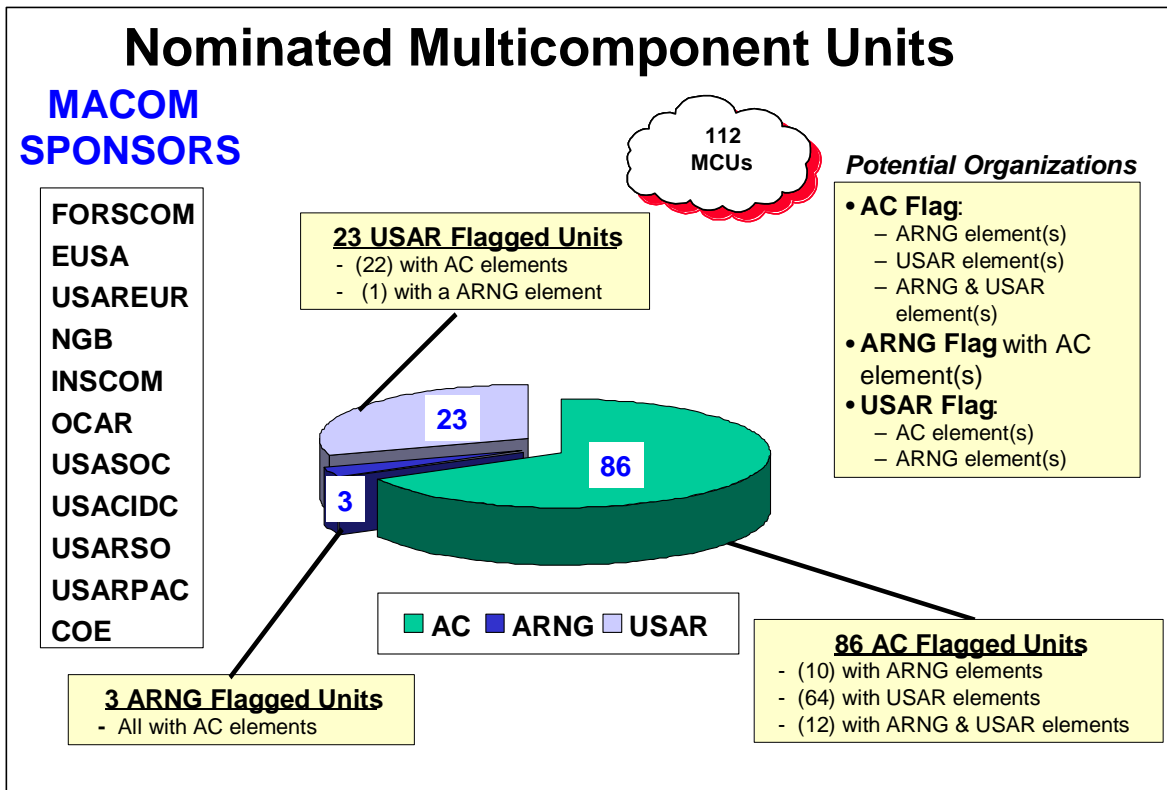
The multicomponent initiative combines personnel from more than one component on a single authorization document. The intent of this initiative is to maximize the integration of AC and RC resources. The initiative does not change a unit's doctrinal requirement for personnel and equipment. No limit has been established for the number of units that may become multi-component and the concept is available to both AC and RC units. The ultimate decision for nominating a unit as multicomponent is based on mission requirements, unique component capabilities and limitations, readiness implications, efficiencies to be gained, and the ability and willingness of each

component to contribute the necessary resources (Figure 7).

TAA-05 established two implementation phases to expand the multicomponent program. Phase One (FY98-00) established the plan to build authorization documents, establish initial units, and refine policy and procedures. Through observation and interaction with the affected units, proponents evaluated procedural options, issued procedural guidance to the field, and identified modifications needed to Army procedural systems.

The objective during Phase Two (FY01 and beyond) is to establish multi component as a routine part of the Army culture. Candidates will be identified during the biennial TAA process, command plan process, or as





**Figure 7. Multicomponent Units**

part of a major Army command initiative. As a result of TAA-07, over 100 units were nominated for multicomponent status. Nominated units include combat, CS and CSS units from the three Army components (Figure 8). Currently, there are 112 nominated and 21 existing multicomponent units in the Army.

## Integrated Divisions

The Army established two AC/ARNG Integrated Divisions (IDs) in October 1999, each consisting of an AC headquarters, commanded by an AC Major General, and three ARNG eSBs. The IDs are designed for training readiness oversight for early deploying ARNG combat elements, to facilitate more rapid deployment of these brigades, and to enhance postmobilization preparation for war.

The U.S. Army Forces Command (FORSCOM) leads the process with active participation from the Army staff, the National Guard Bureau, and the affected Adjutants General.

In December 1997, the Secretary of the Army approved establishing an integrated heavy division headquarters at Fort Riley, Kansas, with a forward element at Fort Jackson, South Carolina, and an integrated light division headquarters at Fort Carson, Colorado (Figure 8). The eSBs selected for the heavy division are the 30th Mechanized Infantry Brigade (NC), the 48th Mechanized Infantry Brigade (GA), and the 218th Mechanized Infantry Brigade (SC). The light division eSBs include the 39th Infantry Brigade (AR), the 41st Infantry Brigade (OR), and the 45th Infantry Brigade (OK). In May 1999,

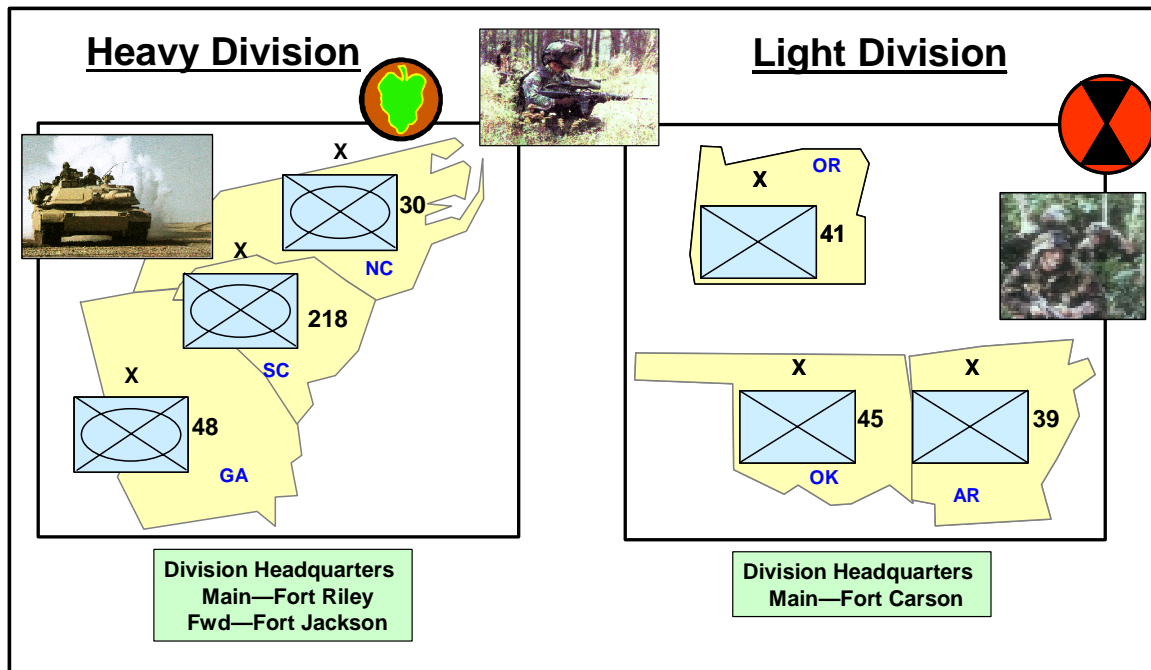


Figure 8. Integrated Division Headquarters and eSB Locations

the CSA named the AC/ARNG IDs: the 24th ID as the heavy division and the 7th ID as the light division. Both divisions were activated effective 1 October 1999.

The Army will continue to take full advantage of the soldiers, equipment, and resourcing of the AC and RC to field the most modern, lethal land combat force in the world.

## Teaming/Corps Packaging

Introduced in the CSA's "One Team, One Fight, One Future" white paper, Army teaming pairs selected AC, ARNG, and USAR units for mutual support of operational requirements. The goal of teaming is to strengthen the Army's ability to respond across the full spectrum of military operations—from state/domestic to multinational/worldwide requirements—while maintaining a strategic reserve. Each component budgets their Teaming requirements through normal

funding processes within their own appropriations. Requirements for FY01 are funded within existing resources. Out-year incremental funding requirements are programmed in the FY02-07 Plan.

Recently updated under a new concept called "corps packaging," all of the ARNG's eight combat divisions and 15 eSBs will be matched with AC divisions at the corps level. The CSA announced this expansion of teaming between AC and RC combat forces on 14 September 2000.

Based on the success of the recent teaming of the 1st Cavalry Division with the Texas National Guard's 49th Armored Division to train for Bosnia, the Army made the decision to expand the teaming concept.

Division teaming began two years ago as a pilot program, pairing the 49th with the 1st Cavalry Division headquartered at Fort Hood, Texas, and California's 40th mechanized

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Infantry Division with the Army's 4th mechanized Infantry Division, also headquartered at Fort Hood. One division would have the lead in certain areas, and the divisions would share resources. When one division deployed, the other would mobilize to provide replacement operations.

The Army's 1st Cavalry Division required additional personnel in order to mobilize to Bosnia in 1998. Had the Army already begun a pilot program matching AC divisions to ARNG divisions, additional personnel could have come from the ARNG.

The latest announcement also expands last year's alignment of six ARNG enhanced brigades to the reactivated 24th Infantry Division at Fort Riley, Kansas, and the 7th Infantry Division at Fort Carson, Colorado, as their primary combat forces.

The newly announced plan takes the program all the way with all the divisions and enhanced brigades of the ARNG included in the teaming concept.

Under I Corps at Fort Lewis, Washington, California's 40th Armored Division is teamed with the Army's 2nd Infantry Division in Korea, while the corps also includes three of the Guard's enhanced brigades: the 116th Armored Cavalry Brigade in Idaho, the 29th Infantry Brigade in Hawaii, and Washington's 81st Infantry Brigade.

Under III Corps at Fort Hood, Texas, the 7th Infantry Division's headquarters at Fort Carson, Colorado, would align with the ARNG's 39th Infantry Brigade in Arkansas, the 41st Infantry Brigade in Oregon, the 45th Infantry Brigade in

Oklahoma and the 155th Armored Brigade in Mississippi.

Also in III Corps the 49th Armored Division remains paired with the 1st Cavalry Division at Fort Hood; Minnesota's 34th Infantry Division with the 4th Infantry Division at Fort Hood; and Indiana's 38th Infantry Division with Fort Carson, Colorado.

Kansas' 35th Infantry Division would fall under V Corps in Heidelberg, Germany along with Louisiana's 256th Infantry Brigade (Mechanized) and Tennessee's 278th Armored Cavalry Regiment.

The XVIII Airborne Corps at Fort Bragg, North Carolina, includes these relationships: the 29th Division with the 10th Mountain Division at Fort Drum, New York; the 28th Division with the 3rd Infantry Division at Fort Stewart, Georgia; and New York's 42nd Infantry Division with the 101st Airborne Division at Fort Campbell, Kentucky.

The 24th Infantry Division at Fort Riley, Kansas, which falls under the XVIII Airborne Corps, would be aligned with New York's 27th Infantry Brigade, North Carolina's 30th Infantry Brigade, Georgia's 48th Infantry Brigade, Florida's 53rd Infantry Brigade, Indiana's 76th Infantry Brigade and South Carolina's 218th Infantry Brigade.

Teaming is more than a training alignment. The ARNG is capable of augmenting, rotating, backfilling, and reinforcing the active force. Now all ARNG combat divisions and enhanced brigades are aligned to the Army's four corps (Figure 9).

# Army National Guard Divisions Corps Alignments

On 14 Sep 00, the CSA announced some of the results from the deliberate planning process at the 122d National Guard Association of the United States in Atlantic City.

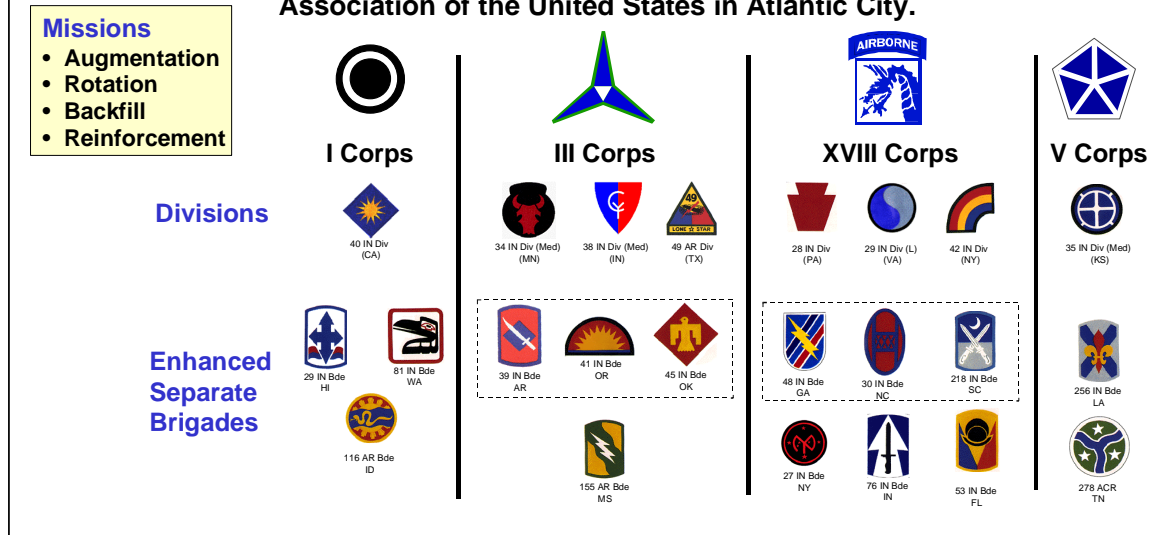


Figure 9. Army National Guard Corps Alignment

## Department of the Army Civilian Personnel

DA Civilians (DAC) are major contributors to the Army's overall mission, comprising approximately 16% of the workforce and occupying vital support positions in all Army operations. More importantly, civilians provide stability and institutional knowledge regardless of the organizational level to which they are assigned, from senior management to administrative support. This is particularly true in the area of depot level maintenance, supply, combat developments, acquisition, training, medical care, research and development, and facilities operations. The civilian work force is a cornerstone of the Army's CONUS-based, power projection strategy.

The overall tempo of Army operational deployments and mission requirements is ever increasing, yet the civilian work force continues to decline. The FY02-07 program reduces civilian end strength to 210,000 by FY07—a total reduction of 193,000 from FY89 to the end of FY07, or 48% since FY89. These reductions are related to CONUS-based outsourcing and privatization efficiencies in base support operations and the reshaping of Army Materiel Command (AMC). The final structure of the Army civilian workforce will be affected by the manning recommendations currently under review in support of the Transformation strategy initiatives. The impacts (additional savings or potential growth) will be assessed in concert with the results of the recent DRID 20/FAIR Act initiatives and programmed A-76 studies.

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## Conclusion

The Army must provide the Nation an array of deployable, agile, versatile, lethal, survivable, and sustainable formations, which are affordable and capable of reversing the conditions of human suffering rapidly and resolving conflicts decisively. To do this, we must design organizational force structures that are interchangeable for different and changing full spectrum environments. We must also equip and train those organizations for effectiveness in any of the missions the Army is asked to perform.

The U.S. Army's force structure must rapidly evolve to best support the NMS and continue meeting the Army's Title 10 responsibilities, while posturing for the challenges of the next generation. The Army's Transformation strategy provides the means to achieve future success. Without the procurement of superior technology and modernized systems as force enablers, that success will be jeopardized. The Army's future force structure is predicated on a robust, fully funded modernization program to mitigate the risk to soldiers and mission.



## Glossary

A&T	Acquisition and Technology
A2C2S	Army Airborne Command and Control System
AAFARS	Advanced Aviation Forward Area Refueling System
AAMDC	Army Air and Missile Defense Command
ABCS	Army Battle Command System
AC	Active Component
AC <sup>2</sup> SEP	Army Command and Control Space Enhancement Program
ACADA	Automatic Chemical Agent Detector and Alarm
ACE	Armored Combat Earthmover
ACE	Analysis and Control Element
ACIS	Aircrew Integrated Systems
ACS	Aerial Common Sensor
ACTD	Advanced Concept Technology Demonstration
ACT-E	Analysis and Control Team-Enclave
ACUS	Army Common User System
ADA	Air Defense Artillery
ADA	Air Defense Artillery
ADRS	Army National Guard Division Redesign Study
ADSI	Air Defense System Integrator
AEHF	Advanced EHF
AEPDS	Advanced Electronic Processing and Dissemination System
AFATDS	Advanced Field Artillery Tactical Data System
AFGWC	Air Force Global Weather Control
AGSE	Aviation Ground Support Equipment
AIM	Abrams Integrated Management
AMC	Army Materiel Command
AMD	Air and Missile Defense
AMDPCS	Air and Missile Defense Planning Control Station
AMDWS	Air and Missile Defense Workstation
AN/TSC	Aging Ground Mobile Force Satellite Terminal
ANAD	Anniston Army Depot
ANAV	Autonomous Navigation System
AOS	Advanced Overwatch Sensors
APAM	Anti-Personnel/Anti-Materiel
APKWS	Advanced Precision Kill Weapon System
APLA	Anti-Personnel Landmine Alternative
APO	Army Procurement Objective
APOD	Airport of Debarkation
APU	Auxiliary Power Units
ARFOR	Army Forces
ARL	Airborne Reconnaissance Low
ARL-M	Airborne Reconnaissance-Multifunction
ARNG	Army National Guard
ASAS	Airfield Status Automation System
ASAS	All Source Analysis System
ASCC	Army Service Component Commands
ASE	Aircraft Survivability Equipment
ASIP	Advanced System Improvement Program
ASOS	Army Support to Other Services
ATACMS	Army Tactical Missile System
ATC	Air Traffic Control

ATCCS	Army Tactical Command and Control System
ATD	Advanced Technology Demonstration
ATEC	Army Test and Evaluation Command
ATEC	All Terrain Cranes
ATIRCM/CMWS	Advance Threat Infrared Countermeasures/Common Missile Warning System
ATNAVICS	Air Traffic Navigation Integration and Control System
ATRJ	Advanced Threat Radar Jammer
ATRWR	Advanced Threat Radar Warning Receiver
ATS	Air Traffic Services
AVCATT-A	Aviation Combined Arms Tactical Trainer-Aviation Reconfigurable Manned Simulator
AVIM-CAMP	Aviation Intermediate Maintenance Containerization and Modernization Program
AVLB	Armored Vehicle Launched Bridge
AVTOC	Aviation Tactical Operations Center
AWS	Advanced Wideband System
BAP	Bridge Adapter Pallet
BAT	Brilliant Anti-Tank
BCIS	Battlefield Combat Identification System
BCS	Battery Computer System
BEB	Bridge Erection Boat
BFA	Battlefield Functional Areas
BFIST	Bradley Fire Support Vehicle
BFV	Bradley Fighting Vehicle
BIDS	Biological Integrated Detection System
BLOS	Beyond Line-of-Sight
BMC4I	Battle Management Command, Control, Communications, Computers, and Intelligence
BMDO	Ballistic Missile Defense Organization
BOA	Battlefield Ordnance Awareness
BSN	Brigade Subscriber Node
BW	Biological Warfare
C2	Command, Control, and Signal
C2	Command and Control
C2V	Command and Control Vehicle
C3	Command, Control and Communications
C3I	Command, Control, Communications, and Intelligence
C3ISR	Command, Control, Communications, Intelligence, Surveillance and Reconnaissance
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
CAA	Center for Army Analysis
CAM/ICAM	Chemical Agent Monitor and Improved Chemical Agent Monitor
CATS	Combined Arms Training Strategy
CBMS	Chemical Biological Mass Spectrometer
CBT	Common Bridge Transporter
CDR	Critical Design Review
CDR	Critical Design Review
CDU	Commander's Display Unit
CE	Construction Equipment
CEP	Concept Evaluation Phase or Concept Evaluation Program
CGS	Common Ground Station
CHIMS	Counterintelligence/Human Intelligence Information Management System
CHPS	Combat Hybrid Power System

CHS	Combat Health Support
CIBS-M	Common Integrated Broadcast Service Modules
CINC	Commander-in-Chief
CINCPAC/USFK	Commander-in-Chief, Pacific Command/U.S. Forces Korea
CINCSOUTH	Commander-in-Chief, Southern Command
CITV	Commander's Independent Thermal Viewer
CK	Containerized Kitchen
CMCS	Countermine Capability Set
CNR	Combat Net Radio
COMINT	Communications Intelligence
COMSEC	Communications Security
CONUS	Continental U.S.
COP	Common Operational Picture
COTS	commercial off-the-shelf
CS/CSS	CS/CSS
CSA	Chief of Staff, U.S. Army
CSEL	Combat Survivor Evader Locator
CSS	Combat Service Support
CSSCS	Combat Service Support Control System
CTC	Transportation Cargo Transfer Company
CTIS	Combat Terrain Information Systems
CTP	Common Tactical Picture (MANSCEN)
CUGR	Cargo Utility GPS Receiver
DA PAM	Department of Army Pamphlet
DAAS	Defense Automatic Addressing System
DAC	Department of the Army Civilians
DAGR	Defense Advanced GPS Receiver
DARPA	Defense Advanced Research Projects Agency
DASR	Digital Airspace Surveillance Radar
DCGS-A	Distributed Common Ground System–Army
DEPMEDS	Deployable Medical Systems
DII COE	Defense Information Infrastructure Common Operating Environment
DIU	Digital Interface Unit
DoD	Department of Defense
DP	M21 Decontaminant Pumper
DRID	Defense Reform Initiatives Directive
DSCS	Defense Satellite Communications System
DSP	Defense Support Program
DT/OT	Developmental Test/Operational Test
DTES	Division Tactical Exploitation System
DTLOMS	Doctrine, Training, Leader Development, Organization, Materiel and Soldier
DTSS	Digital Topographic Support System
DTSS-H	Digital Topographic Support System-Heavy
DTSS-L	Digital Topographic Support System-Light
EAAD	Enhanced Area Air Defense
EAC	echelon above corps
EAD	echelon above division
EAR	Executive Agent
EBC	Embedded Battle Command
ECS	Effects Control System
ECU/PPU	Environmental Control Unit/Power Providing Unit
EDT	Engineering Development Test
EHF	Extremely High Frequency

ELINT	Electronic Intelligence
EMD	Engineering and Manufacturing Development
EMM	Engineer Mission Modules
ENS	Explosive neutralization system
EO	Electro-Optic
EO/IR	Electro-optic/Infrared
EOC	Early Operational Capability
EPLRS	Enhanced Position Location Reporting System
ERDC	Engineer Research and Development Center
eSB	enhanced Separate Brigades
ESLRF	Eye Safe Laser Range Finder
ESMC	Mongoose Explosive Standoff Minefield Clearer
ESP	Extended Service Program
ETOS	Enhanced Tower Simulator
ETRAC	Enhanced Tactical Radar Correlator
EUE	extended user evaluation
EW	Electronic Warfare
FAA	Federal Aviation Administration
FAAD	Sentinel and Forward Area Air Defense
FAADC2	Forward Area Air Defense Command and Control
FAIR	Federal Activities Initiative Reform
FAIR Act	Federal Activities Inventory Review
FARE	Forward Area Refueling Equipment
FARP	Forward Arming and Refueling Point
FASCAM	Field Artillery Scatterable Mines
FBCB2	Force XXI Battle Command Brigade and Below
FCR	Fire Control Radar
FCS	Future Combat Systems
FCT	Foreign Comparative Test
FDO	flexible deterrent options
FDS	Fire Direction System
FED	Forward Entry Device
FEMA	Federal Emergency Management Agency
FLIR	Forward Looking Infra-Red
FMTV	Family of Medium Tactical Vehicles
FOV	family of vehicles
FPAR	Fixed Base Precision Approach Radar
FRP	Full-Rate Production
FRS	Forward Repair System
FSCOORD	Fire Support Coordinator
FSCS	Future Scout and Cavalry System
FTL	Far Target Locate
FTR	Future Transport Rotorcraft
FTTS	Future Tactical Truck System
FUE	First Unit Equipped
FY	Fiscal Year
FYDP	Future Years Defense Plan
G&C	Guidance & Control
G/VLLD	Ground/Vehicular Laser Locator Designator
GALE	Generic Area Limitation Environment
GB	Grenadier BRAT
GBS	Global Broadcast Service
GCCS	Global Command and Control System

GCCS-A	Global Command and Control System–Army
GCS	Ground Control Station
GCSS-Army	Global Combat Support System-Army
GLMRS	Guided Multiple Launch Rocket System
GLPS	Gun Laying and Positioning System
GPR	Ground Penetrating Radar
GPS	Global Positioning System
GPS/INS	GPS Inertial Navigation System
GRAM	GPS Receiver Applications Module
GRCS	GUARDRAIL Common Sensor
GSR	Ground Surveillance Radar
GSR/IREMBASS	Ground Surveillance Radar/Improved Remotely Monitored Battlefield Sensor System
GSTAMIDS	Ground Standoff Minefield Detection System
GTN	Global Transportation Network
HD/LD	High Demand/Low Density Units
HDSB	Heavy Dry Support Bridge
HEMTT	Heavy Expanded Mobility Tactical Truck
HET	Heavy Equipment Transporter
HETS	Heavy Equipment Transporter System
HIMAD	High-to-Medium Altitude Air Defense
HIMAD	High-to-Medium Altitude Air Defense
HIMARS	High Mobility Artillery Rocket System
HMEE	High Mobility Engineer Excavator
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HPT	High Payoff Targets
HPW	High Pressure Washers
HQDA	Headquarters, Department of the Army
HSI	hyperspectral imagery
HSTAMIDS	Handheld Standoff Mine Detection System
HTI	Horizontal Technology Integration
HUMINT	Human Intelligence
HUMRAAM	High Mobility Multipurpose Wheeled Vehicle-Mounted Medium-Range Air-to-Air Missile
HVMP	Volume Map Production
HYEX	Hydraulic Excavators
IAV	Interim Armored Vehicle
IBC	Improved Boat Cradle
IBCT	Interim Brigade Combat Team
IBS	Integrated Broadcast Service
IC3	Integrated Combat Command and Control
ICBM	Intercontinental Ballistic Missile
ICHO	Improved Cargo Handling Operations
ICV	Infantry Carrier Vehicles
IDM	Improved Data Modem
IETM	interactive electronic technical manual
IFSAS	Initial Fire Support Automated System
IFV	Infantry Fighting Vehicle
IMETS	Integrated Meteorological System
IMINT	Imagery Intelligence
IO	information operations
IOC	Initial Operating Capability
IOT&E	Initial Operational Test and Evaluation
IPADS	Improved Position and Azimuth Determining System



IPB	Intelligence Preparation of the Battlefield/Battlespace
IPF	Integrated Processing Facility
IPT	Integrated Product Team
IR	infrared
IRB	Improved Ribbon Bridge
IS	Information Superiority
ISO	International Standard Organization
ISR	Intelligence, Surveillance, and Reconnaissance
ISRT	Intelligence, Surveillance, Reconnaissance, and Targeting Support
JBPDS	Joint Biological Point Detection System
JCDB	Joint Common Database
JCS	Joint Chiefs of Staff
JFLCC	Joint Forces Land Component Command
JLOTS	Joint Logistics Over-the-Shore
JMLS	Joint Modular Lighter System
JOPEs	Joint Operation Planning and Execution System
JROC	Joint Requirements Oversight Council
JSFXD program	Joint Fixed Site Decontamination
JSSD	Joint Sensitive Equipment Decontamination
JSTARS	Joint Surveillance Target Attack Radar System
JTA-A	Joint Technical Architecture-Army
JTAGS	Joint Tactical Ground Station
JTAGS/M3P	Joint Tactical Ground Station/Multi-Mission Mobile Processor
JTAMD	Joint Theater Air and Missile Defense
JTMD	Joint Theater Missile Defense
JTRS	Joint Tactical Radio System
JTT	Joint Tactical Terminal
JTT/CIBS-M	Joint Tactical Terminal/Common Integrated Broadcast Service Modules
JV 2020	Joint Vision 2020
KEM	kinetic energy missiles
LADS	Laundry Advanced System
LAN	Local Area Network
LATP	Lima Army Tank Plant
LDR	low data rate
LDS	Lightweight Decontamination Systems
LHS	Load Handling System
LHT	Line Haul Tractor
LLDR	The Lightweight Laser Designator/Range-finder
LNBCRS	Light Nuclear Biological Chemical Reconnaissance System
LOS	limited line-of-sight
LOSAT	Line-of-Sight Anti-Tank weapon
LOTS/JLOTS	Logistics Over the Shore
LPD	low probability of detection
LRAS3	Long Range Advanced Scout Surveillance System
LRIP	Low-Rate Initial Production
LUT	Limited User Test
LW	Light Weight
LW155	Lightweight 155mm Howitzer
LWP	Lightweight Water Purifier
M3P	Multi-Mission Mobile Processor
MACOM	Major Command
MANPADS	Manportable Air Defense System
MANSCEN	U.S. Army Maneuver Support Center

MASINT	Measurement and Signature Intelligence
MC4	Medical Communications For Combat Casualty Care
MCB	Mine Clearing Blade
MCS	Modular Causeway System
MCS	Maneuver Control System
MCSC	Marine Corps System Command
MCS-Eng	Maneuver Control System-Engineer
MD	metal-detection
MDR	medium data rate
MDS	Modular Decontamination System
MEADS	Medium Extended Air Defense System
MEDEVAC	Medical Evacuation
MELIOS	Mini Eye-Safe Laser Infrared Observation Set
METT-TC	mission, enemy, troops, terrain, time, and civilians
MFCS	Mortar Fire Control System
MGB	Medium Girder Bridge
MGS	Mobile Gun System
MHE	Material Handling Equipment
MI	Military Intelligence
MICAD	Multipurpose Integrated Chemical Agent Detector
MIES	Modernized Imagery Exploitation System
Millimeter Wave	Millimeter Wave
MILSATCOM	Military Satellite Communications
MILSTAR	Military Strategic and Tactical Relay
MIST	Multi-Band Integrated Satellite Terminal
MITT	Mobile Integrated Tactical Terminal
MKT	Mobile Kitchen Trailer
MLC	Military Load Class
MLRS	Multiple Launch Rocket System
MNS	Mission Needs Statement
MOA	Memorandum of Agreement
MOOTW	Military Operations Other Than War
MOPMS	Modular Pack Mine System
MOPP	Mission Oriented Protective Posture
MOSAIC	Multifunctional On-the-Move Secure Adaptive Integrated Communications
MOTS	Mobile Tower System
MPCV	Mine Protected Clearance Vehicle
MRI	Medical Reengineering Initiative
MSE	Mobile Subscriber Equipment
MSTAR	MLRS Smart Tactical Rocket
MTI	Moving Target Indicator
MTOE	Modified Table of Organization and Equipment
MTOF	Mission Task Organized Forces
MTS	Movement Tracking System
MTW	Major Theater War
MUA	Military Utility Assessment
MW	Missile Warning
MWO	Modification Work Orders
NAPS	New Aviation Ground Power System
NAS	National Airspace System
NAVWAR	Navigation Warfare
NBC	Nuclear, Biological and Chemical
NBCRS	Nuclear, Biological and Chemical Reconnaissance System

NCA	National Command Authorities
NCS	Network Control Station
NDI	Nondevelopmental Item
NFM	North Finding Module
NLOS	Non-Line-of-Sight
NMS	National Military Strategy
NOC-V	Network Operations Center Vehicles
NVL	Night Vision Lab
O&M	Operations and Maintenance
O&O	Operational and Organizational
O&S	Operations and Support
ODS	Operation Desert Storm/Shield
ODS-E	Operation Desert Storm, Engineer Vehicle
OICW	Objective Individual Combat Weapon
OPTEMPO	operational tempo
ORD	Operational Requirements Document
OSA	Operational Support Airlift
P3I	Pre-Planned Product Improvement
PAC-3	Patriot Advanced Capability Mod 3
PB02	President's Budget FY02
PBD	Recent Program Budget Decision
PDRR	Prototype Definition and Risk Reduction
PEO	Program Executive office
PLGR	Precision Lightweight GPS Receiver
PLS	Palletized Load System
PNT	Position, Navigation, and Timing
POL	Petroleum, oil, and lubricants
POM	Program Objective Memorandum
POS/NAV	Position/Navigation
PPS	Precise Positioning Service
PVT	Positioning, Velocity, and Time
PVT	Production Verification Testing
QDR	Quadrennial Defense Review
R&D	research and development
RC	Reserve Component
RCSS	Robotic Combat Support System
RCU	Remote Control Unit
RDT&E	Research, Development, Test, and Evaluation
RDT&E	Research, Development, Test And Evaluation
RFI	Radar Frequency Interferometer
RFPI	Rapid Force Projection Initiative
RIVET JOINT EP3	AF - RC-135 reconnaissance aircraft
RMP	reprogrammable microprocessor
ROE	Rules of Engagement
RSCAAL	Remote Sensing Chemical Agent Alarm
RSTA	Reconnaissance Surveillance and Target Acquisition
RTCH	Rough Terrain Container Handler
RWS	Remote Workstation
S&T	science and technology
SA	situational awareness
SACO	Stability and Support Operations
SAGR	Stand-alone Air GPS Receiver
SAR	Synthetic Aperture Radar

SASO	Stability and Support Operations
SATCOM	Satellite Communications
SBIRS	Space-Based Infrared System
SCA	Software Communications Architecture
SCAMP	Single Channel Anti-Jam Manportable
SCDL	Surveillance and Control Data Link
SDD	System Development and Demonstration
SECDEF	Secretary of Defense
SEE	Small Emplacement Excavator
SEMA	Special Electronic Mission
SEP	System Enhancement Program
SGF	Second Generation Forward Looking Infrared Radar (FLIR)
SHF	super high frequency
SHORAD	Short-Range Air Defense
SICPS	Standardized Integrated Command Post System
SIGINT	Signals Intelligence
SIIRCM	Suite of Integrated Infrared Countermeasure
SINCGARS	Single Channel Ground and Airborne Radio System
SIRFC	Suite of Integrated Radio Frequency Countermeasures
SLGR	Small Lightweight GPS Receiver
SMART-T	Secure Mobile Anti-Jam Reliable Tactical Terminal
SMDC	Army Space and Missile Defense Command
SME	subject matter experts
SOA	Special Operations Aviation
SOC	Space Operations Cell
SOF	Special Operations Forces
SoS	Systems of Systems
SPORT	Soldier Portable On-System Repair Tool
SRB	Standard Ribbon Bridge
SRBSDS	Short Range Biological Standoff Detection System
SRS	Standard Robotic Systems Program
SSC	Small Scale Contingencies
STACCS	Standard Theater Army Command and Control System
STAMIDS	Standoff Minefield Detection System
STAR-T	Super High Frequency Tri-Band Advanced Range Extension Terminal
STO	Science and Technology Objective
TAA	Total Army Analysis
TACCIMS	Theater Army Command and Control Information Management System
TADSS	Training Aids, Devices, Simulators and Simulations
TADSS	Training Aids Devices Simulators and Simulations
TAIS	Tactical Airspace Integration System
TC AIMS	Transportation Coordinator-Automated Information for Movement System
TDA	Table of Distribution and Allowances
TENCAP	Tactical Exploitation of National Capabilities
TEP	Theater Engagement Plan
TES	Tactical Exploitation System
TFFS	Tactical Firefighting System
TFFT	Tactical Firefighting Truck
THAAD	Theater High Altitude Area Defense
THSDN	Tactical High Speed Data Network
TI	Tactical Internet
TIM	Toxic Industrial Materials
TMDE	Test Measurement and Diagnostics Equipment

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TMIP	Theater Medical Information Program
TMS	Thermal Management System
TOC	Tactical Operations Center
TOW	Tube-launched, optically-tracked, wire-guided missile
TRADOC	Training and Doctrine Command
TRI-TAC	Tri-Service Tactical Communications
TSV	Theater Support Vessel
TUAV	Tactical Unmanned Aerial Vehicle
TWV	Combat Service Support including Tactical Wheeled Vehicles
UAV	Unmanned Aerial Vehicle
UE	User Equipment
UGV	Unmanned Ground Vehicle
UGVROP	Unmanned Ground Vehicle Rapid Obscuration Platform
ULCANS	Ultra-Lightweight Camouflage Net System
USAF COMINT	U.S. Air Force Communications Intelligence
USAR	U.S. Army Reserve
WAM	Hornet Wide Area Munition
WIN-T	Warfighter Information Network-Tactical
WMD	Weapons of Mass Destruction
WRAP	Warfighter Rapid Acquisition Program
WTEM	Weather Terrain and Environmental Monitoring
WWMCCS	Worldwide Military Command and Control System